IN TWO SECTIONS — SECTION ONE

THE PAPER INDUSTRY and PAPER WORLD

AN EDUCATIONAL NEWS MAGAZINE—APRIL, 1947

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DETROIT

Whatever you make in—

paper

PATTERSON
Satisfactory MACHINERY
WILL HELP YOU DO A BETTER JOB!
Richard L. Cummings
President

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SINCE 1865

NOW . . . A LINE OF PAPER CUTTERS WITH

Simple, Quick Knife Adjustment

SIMPLE, QUICK KNIFE ADJUSTMENT: A turn of the knurled collar on pull bar adjusts knife to cutting stick. No tools are necessary. Self-locking. Adjusts to the thickness of one sheet.

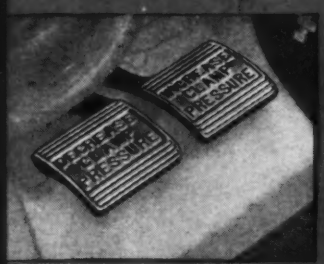
That's why Trimming is SPEEDIER . . . CLEANER WITH A Seybold "Sixty"

Simple, quick knife adjustment is just one more reason why mill trimmer and spacer operators are saying of the new Seybold "Sixty"—"that's the machine for me".

Recognizing that certain adjustments, such as changing clamping pressure and resetting the knife, can never be eliminated, these and other tasks have been greatly simplified. The efficient, new line of Seybold "Sixty" Mill Trimmers and Spacers have been designed to conserve the operator's time and energy. In the long run, this spells greater productivity . . . greater tonnage.

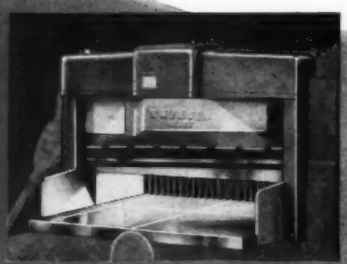
Today, Seybold Mill Trimmers and Spacers are faster, safer and more accurate —are more efficiently lubricated and maintenance has all but disappeared.

Get all the facts from your Harris-Seybold representative.

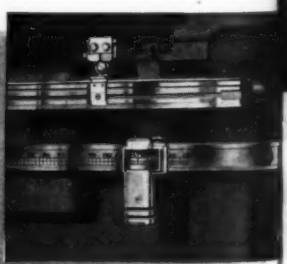


CONTROLLED BY FOOT PEDALS: A simple pumping motion changes clamping pressure instantly. No tools are needed. Saves time. Saves energy. A shadow gauge registers the pressure reading.

EASILY LUBRICATED: Zerk fittings are provided for cleaner, easier, more permanent lubrication. Lubrication points are out in the open, encouraging more thorough lubrication.



FLOODLIGHTED TABLE AND GAUGE—MAGNIFIED MEASURING BAND: Less operator fatigue. Greater safety. Less chance for errors. Greater production of more accurately trimmed work.



FASTER AUTO-SPACERS: Automatic moves stock into position at a higher rate than ever before. Cut stops can be set, at one time, to make all cuts necessary on several jobs.

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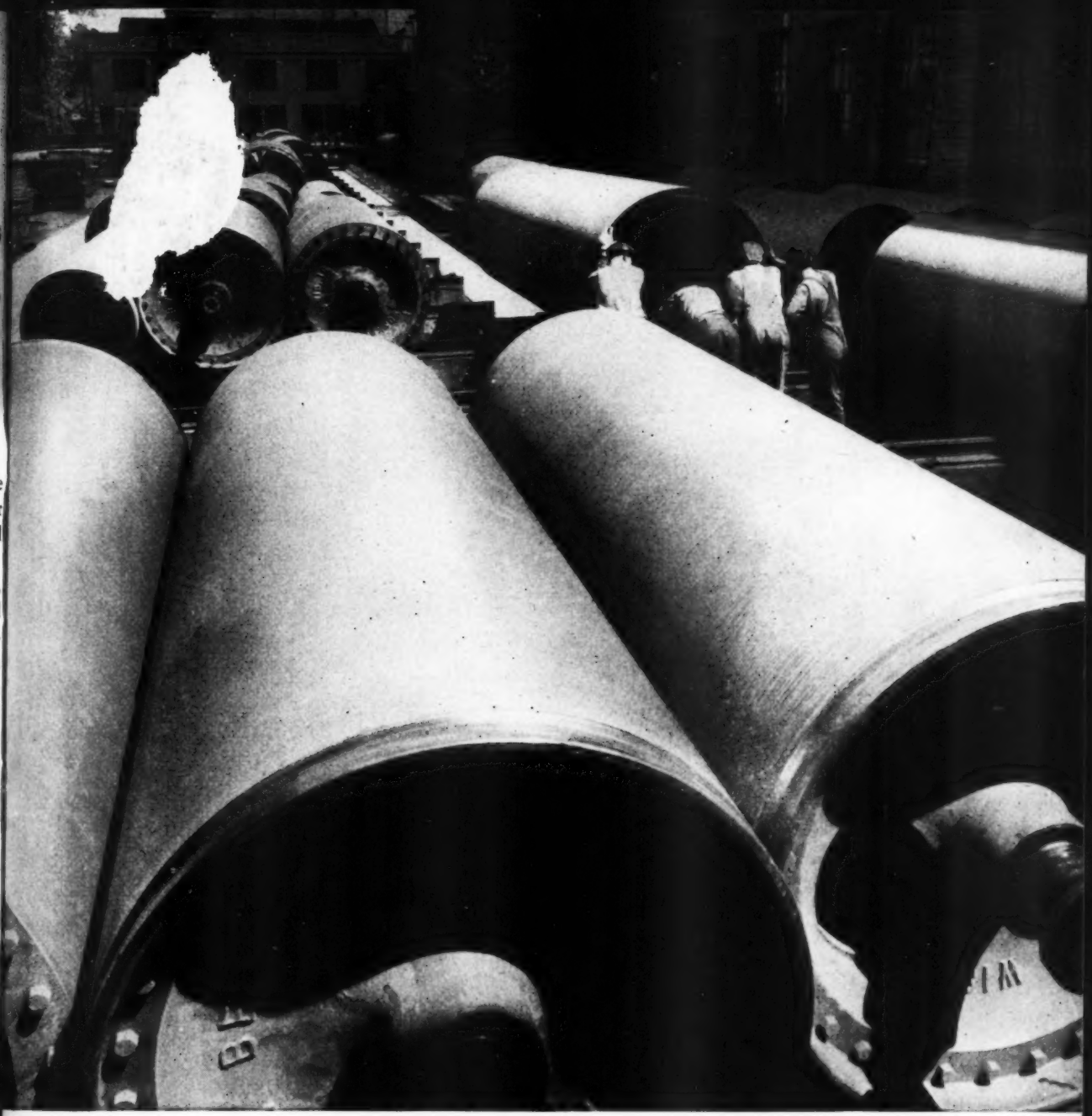
Harris-Seybold Company • General Sales Offices, Cleveland 5, Ohio

HARRIS PRESSES • SEYBOLD MILL TRIMMERS AND AUTO-SPACERS • OTHER GRAPHIC ARTS EQUIPMENT

Backed up by the world's largest and most highly-skilled, factory-trained paper cutter service organization.



Big parts for big futures

Several thousand square feet of space are required for storage of Beloit dryers between machining operations. And constant expansion of the plant is necessary. The new building, recently erected at Beloit, adds 30,500 square feet to the overall area of 12 acres. Since Beloit's beginning in 1858, many hundreds of paper machines have been produced for use around the world. *Beloit Iron Works, Beloit, Wisconsin.*

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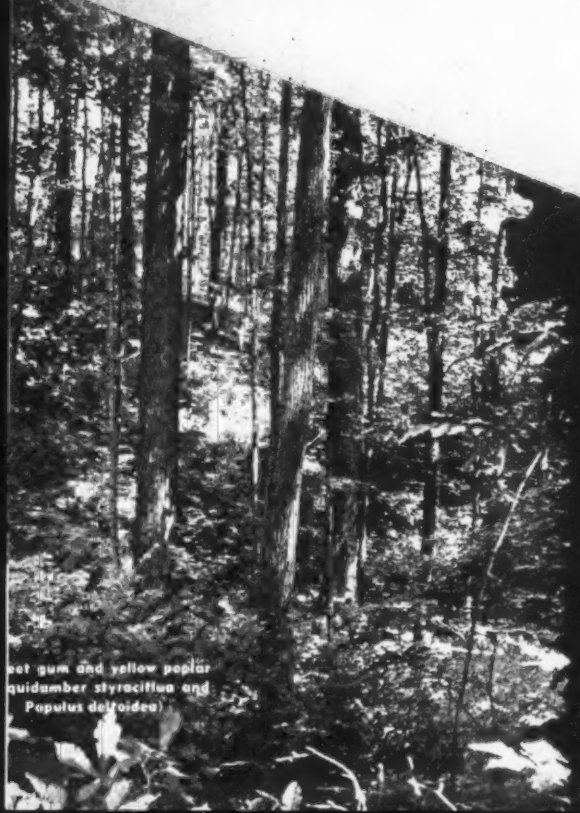
WHEN YOU BUY BELOIT...YOU BUY MORE THAN A MACHINE!

BELOIT

PAPER MACHINERY

REFINING—NOT CUTTING . . .
Broadleaf Weed Woods in the North and South lend themselves particularly well to refining by Sprout-Waldron where work on the fiber diameter rather than on its length is a requisite.

Birch and Aspen
Betula papyrifera and Populus t



eet gum and yellow poplar
quidumber styraciflua and
Populus deltoidea)

Competent assistance in your planning is a free discharge of Sprout-Waldron service.

SPROUT-WALDRON & CO.

Manufacturing Engineers

MUNCY PENNSYLVANIA

Over 12 years of drier roll experience have contributed to the many advantages and high standards of the Lukenweld Jacketed Drier Roll. Of welded, double shell, steel plate construction, this superior heat exchanger is produced in a wide range of designs and sizes, with advantages not found in other type rolls.

LUKENWELD JACKETED DRIER ROLLS . . .

1. Have thinner, stronger walls than cast iron rolls—safe with steam pressures up to 350 psi, and more.
2. Can be used in the high temperature range that employs high boiling point, heat transfer liquids.
3. Save power and reduce other operating costs.
4. Assure greater steam turbulence in the roll.
5. Eliminate stagnancy inherent in the low pressure, drum type of drier.
6. Guarantee more uniform face temperature.
7. Speed up heat flow.
8. Insure more production—up to 18% and over.
9. Reduce weight.
10. Give better condensate removal.
11. Guarantee mechanical safety.
12. Hold their shape.
13. Can be made in a wide range of designs.
14. Offer a wide range of sizes to over 18 ft. in diameter.
15. Are an integral piece of steel—no bolts, no nuts, no siphons to work loose.

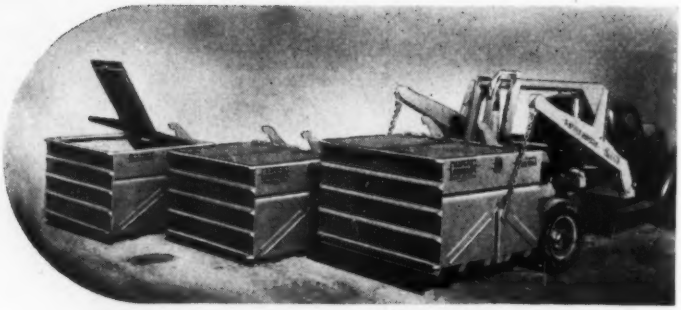
Complete information on the Lukenweld Jacketed Drier Roll is in Bulletin 358. For a copy, please write to Lukenweld, Inc., Division of Lukens Steel Company, 367 Lukens Building, Coatesville, Pa.

**From 2 ft. to 18 ft. O.D. and over. Patents applied for.*

LUKENS
LUKENWELD DIVISION

DRIER ROLLS AND DRYING MACHINERY

ONE TRUCK SERVES 20 BODIES IN THIS PLANT



Another Dempster Development For Industrial Materials Handling

★ Another typical example of how the Dempster-Dumpster is saving time, manpower, trucks, tires, and gas in leading industrial plants of almost every classification.

In this case, twenty standard Dempster-Dumpster drop-bottom bodies of 6 cu. yd. capacity each, equipped with special twin, self-balancing, spring hinged lids, are spotted throughout one of America's leading factories. A few are placed in convenient spots for receiving waste and rubbish. Others are placed at strategic points for recovering metal shavings. As each body is filled, forked truck conveys loaded body to convenient point where truck, equipped with the Dempster-Dumpster Hoisting unit, hoists load to carrying position, and dumps it at delivery point, all under full control from driver's seat. When empty body is returned, another loaded one, perhaps with a different type of material, is there for hauling and dumping . . . an uninterrupted cycle of materials handling using twenty bodies but with only one truck.

In dozens of other plants, various types of bodies are in use handling materials of almost every description from dust to liquid . . . light to heavy up to 7½ tons pay load . . . finished and unfinished products . . . hot materials up to 1500 degrees F . . . and in every operation with one truck serving from 6 to 50 bodies.

The chances are that the advantages of the Dempster-Dumpster can and should be adapted to your plant. Let our engineers cooperate with you. Write for our complete catalog No. 247 now.

Illustrations on this page tell the operating story of the Dempster-Dumpster.

Top right shows a loaded body ready for hoisting. Shown also in this photo is the special twin, self-balancing, spring hinged tops on this particular body.

Center Photo shows loaded body in carrying position.

Bottom Photo illustrates instant, or controlled, dumping method of the Dempster-Dumpster bottom dumping type of body.

Types of bodies available are unlimited. Your requirements determine the design. Cooperation of our engineers with those of the customer has corrected hundreds of materials handling problems and at tremendous savings.

THE PAPER INDUSTRY and PAPER WORLD

(Reg. U. S. Pat. Off.)

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***Published monthly by* FRITZ PUBLICATIONS, INC., 59 East Van Buren Street, Chicago 5, Illinois**

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THE PAPER INDUSTRY and PAPER WORLD is indexed regularly in "The Industrial Arts Index." An index to each volume is issued annually by the publisher. The index to Volume 28 is Section Two of this issue.
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Associated Business Papers, Inc.

Entered as second class matter June 29, 1938, at the post office at Chicago, Ill., under the Act of March 3, 1879. Subscriptions in the United States, U. S. Possessions, Canada, Cuba and Mexico, $2.00 for one year, $3.00 for two years. All other countries $3.00 for one year, $5.00 for two years.

Another "Half-Dozen" CB&I-Built DIFFUSERS

separate liquor from pulp at a Southern kraft mill

The above photo shows three of six 14-ft. 6-in. diam. by 33-ft. 4-in. diffusers we recently built for a kraft mill in the South. These "washers" are part of the equipment installed during an expansion program and supplement six other diffusers we built several years ago for this same mill.

The diffusers are arranged in a half-circle, with a cyclone separator above them. Pine chips are cooked in the digesters (which were also built at one of our plants) with steam for about 3½ hours under 125 lbs. per sq. in. pressure. The pulp and liquor is then blown into the separator and drops by gravity through a swivel piping connection into any one of the six diffusers. Clear water enters each diffuser. The pulp is washed with clear water in the diffusers for 12 hours, after which the black liquor is drained off, concentrated to about 60% solid matter and burned in recovery furnaces.

Chicago Bridge & Iron Company builds many types of steel plate structures for the paper industry including sulphate and sulphite digesters, cyclones, flat-bottom storage tanks, salt cake bins, cookers and elevated water tanks. Our facilities include x-raying and stress-relieving in accordance with code requirements.

Let us work with you, the next time you need steel plate structures. Write our nearest office for quotations.

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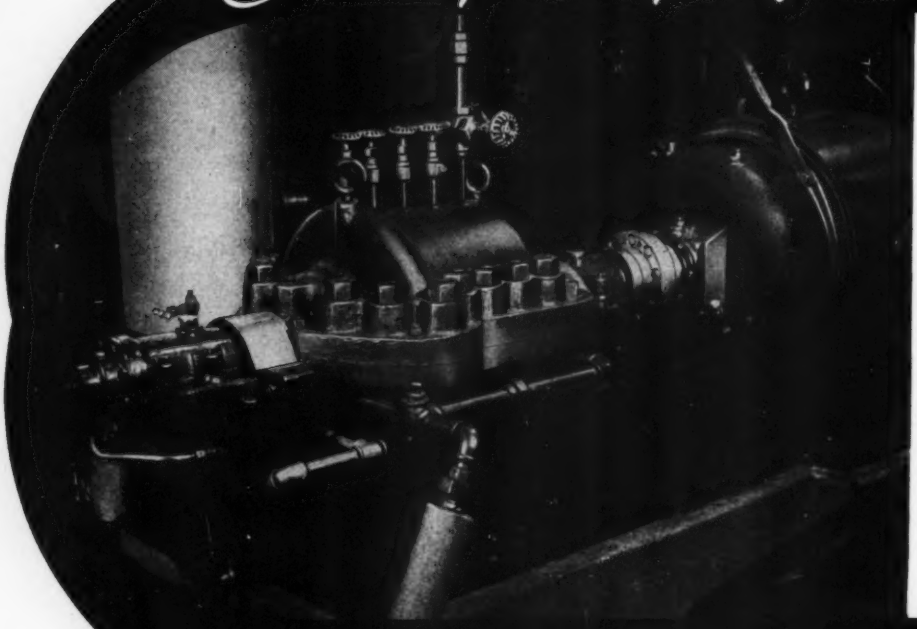
Hardly a sign of wear . . .



Can you match this record?

This relatively small boiler feed pump, delivering 250 gpm against 513 psi, required no replacement parts or reconditioning after 45,000 hours of service.

. . . after 45,000 hours of service

THE EXCELLENCE OF DE LAVAL design and construction is demonstrated by the performance of a De Laval boiler feed pump recently inspected after 45,000 hours of service in the municipal power plant of the City of Wyandotte, Michigan.

The following paragraph is quoted from the inspector's report:

"All machined surfaces of the case are in original condition. Diaphragms and balance arrangement fit neatly in all bores. Horizontal joint has no indication of leakage. Faces of rotating and stationary balance plates are in good condition; wear is approximately .005". Shaft sleeves are highly polished but are not worn or grooved. There is no leakage between shaft sleeve spacers and wheels. The shaft has no indication of contact with water. Wheel wearing rings show no indication of wear. No new parts were used in reassembling."

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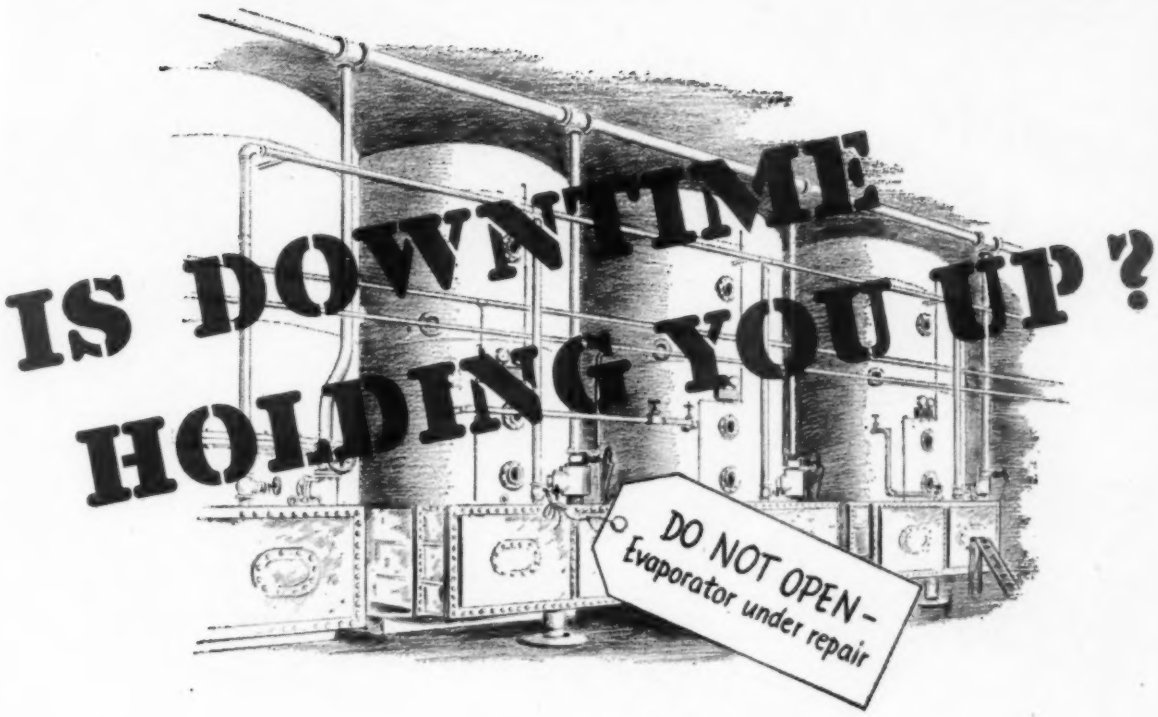

BECAUSE they last, on an average, 3 times longer, Timken evaporator tubes of 5% nickel steel drastically reduce expensive downtime.

For the more concentrated effects in black liquor evaporator service, a recent survey showed that Timken 5% nickel steel averages 300% more service than carbon steels. In addition, these fine alloy steel seamless tubes assure longer service from the tube sheets themselves.

Thus, replacement costs are cut considerably at the same time that evaporator downtime losses are reduced.

Nowhere else can you find the combination of experience in high temperature applications, choice of steels and assurance of quality that The Timken Roller Bearing Company offers.

Why not let a member of our Technical Staff make specific recommendations for your application? Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.

JORDAN BARS CAN LAST LONGER

Jordan plug partially filled with *Monel Bars* and plug bands. Standard on many types of jordans, and safely used in combination with bars of other materials, *Monel plug bands* assure anchorage unendangered by corrosion and corrosion fatigue. *Photo courtesy of Sharple Bros., Middletown, Ohio.*

. . . and cost less!

Frequent replacement of jordan fillings is not only costly . . . but *unnecessary*. Paper and paper board mills have proof . . . in the form of actual *performance records*.

In an *Appleton* jordan, for example, Monel* plug bars gave 13 years' service refining bleached sulfite stock for bond, ledger and writing papers.

Monel plug and shell bars in a *Majestic* jordan served six years and nine months on raw stock for coated papers. Monel plug bars and shell bars in two jordans refining sulfite and sulfate stocks for bag and wrapping paper, as well as tissue and M.G. waxing paper, are still in use *after 10 years of service.*

Nor are these isolated cases. Other mills report similar experiences, and some have obtained even longer service from Monel jordan fillings.

Monel, in addition to its inherent ability to withstand corrosion, is extremely tough and possesses high impact resistance. Jordan fillings retain smooth working surfaces. They do not feather, and the edges do not chip. The result is an improved refining action and more thorough hydration.

Information on Monel fillings may be secured from your regular supplier or from any of the jordan manufacturers. Further data about the refining characteristics of Monel jordan bars, including mechanical properties and hardness specifications, as well as performance and cost records in typical installations, are contained in the folder, *Monel Jordan Bars*. Write us for your copy.

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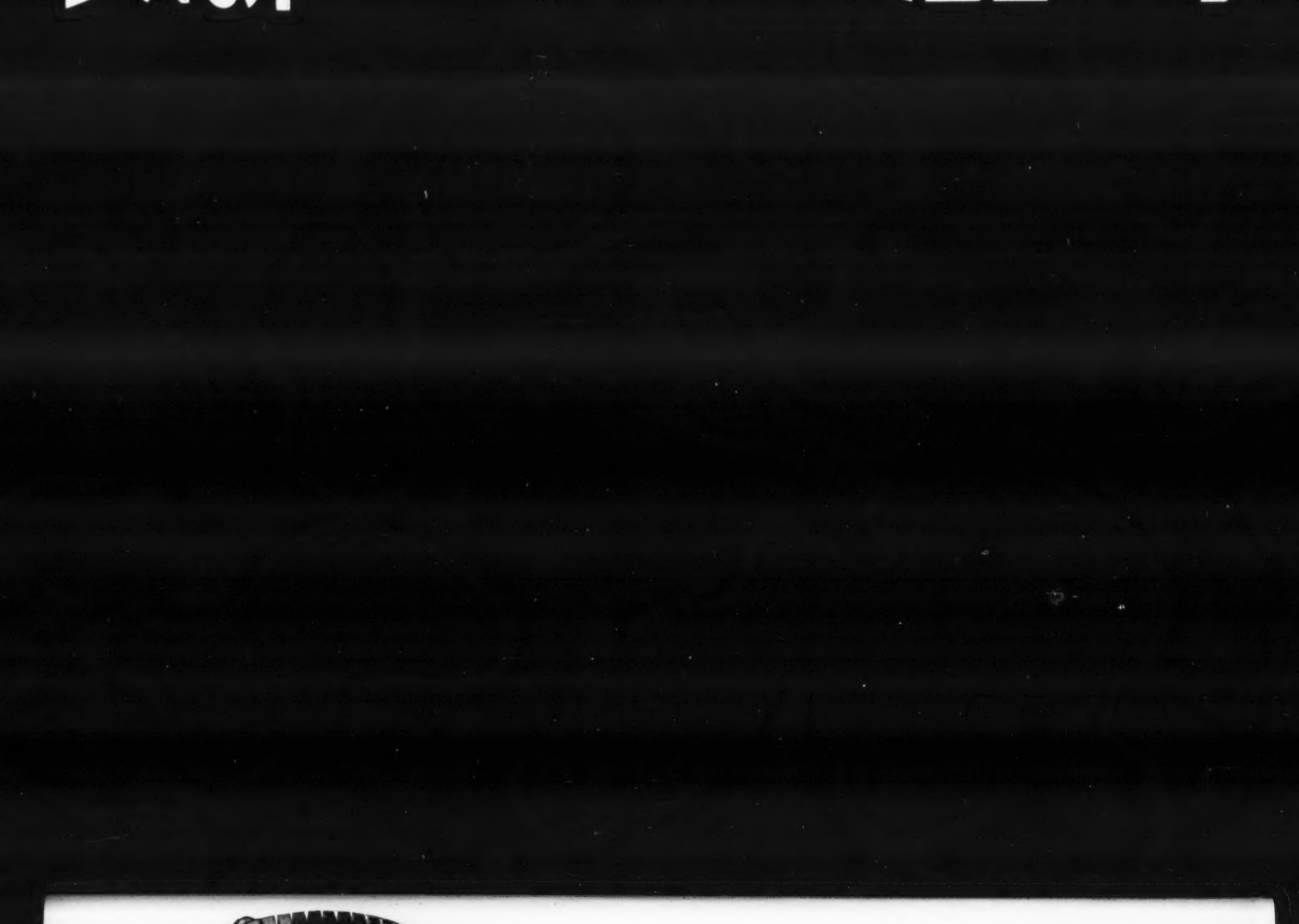

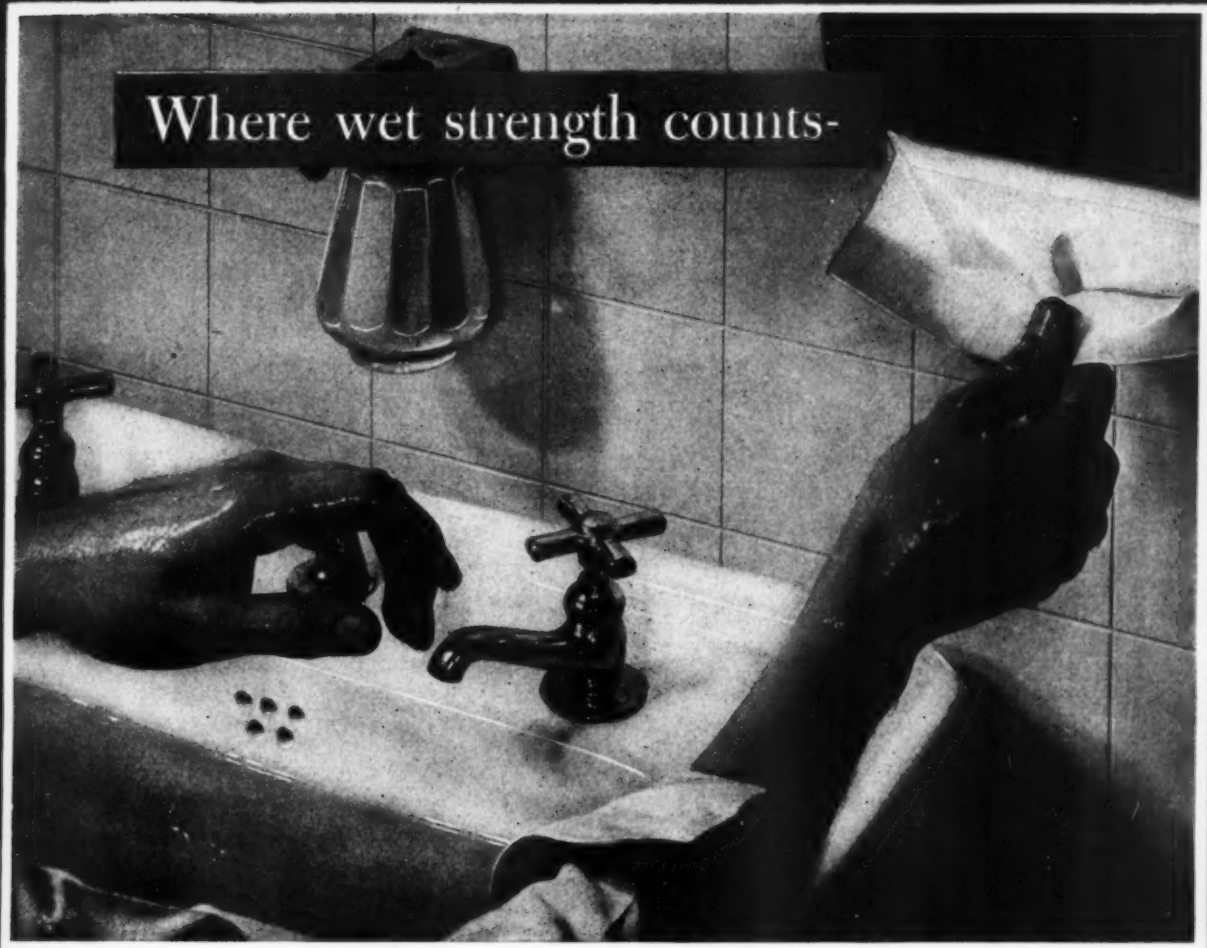

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In paper toweling—and wherever wet strength is of prime importance—UFORMITE 467 and UFORMITE 470 are especially valuable. These urea formaldehyde resins increase wet strength substantially . . . and do it efficiently and economically.

UFORMITE 467 is particularly designed for use with Kraft by beater addition. UFORMITE 470 is recommended especially for sulfite stocks, can also be used advantageously with Kraft, rag and groundwood stocks, in the manufacture of high wet strength glassine, wrapping paper, chart and ledger paper or light weight absorbent tissues.

You can easily add these urea formaldehyde resins to your present manufacturing process . . . with no major change in your operating procedure. And—with no pretreatment, no special handling, no extra steps—as little as 1% resin solids on dry fibre weight will increase your paper wet strength as much as 300%!

And UFORMITES 467 and 470 do more than give you higher wet strength—they improve dry tensile and Mullen, fold, uniformity of sizing, and coating surface characteristics. Why not look into the many benefits resulting from these resins? We will be glad to send full details on request.

UFORMITE *is a trade-mark, Reg. U. S. Pat. Off.*

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The White Water Reclaimer, designed for the paper industry by Permutit,* not only recovers a high percentage of fibre and filler from this "waste" water, but permits re-use of the water.

TAKE PAPER QUALITY—Impurities in process water can mar the quality of your paper product . . . may mean rejects, with loss of profit and goodwill. Permutit Water Conditioning *removes* dirt, iron and other impurities from the water supply . . . gives you a cleaner, brighter sheet.

If you have a water problem, there's no better time to get after it than now, and no better way than Permutit Water Treatment. Modern, economical Permutit equipment gives the paper mill *complete control* of water quality.

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When you're in a jam on bronze parts or bearings—call for a N-B-M "trouble-shooter"!

Our Field Engineers are always alert to help improve performance or solve technical problems for you.

N-B-M Field Engineers may have the answer to your bronze part problems. They will serve you whenever you need them.

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We put more service into them— you get more service out of them

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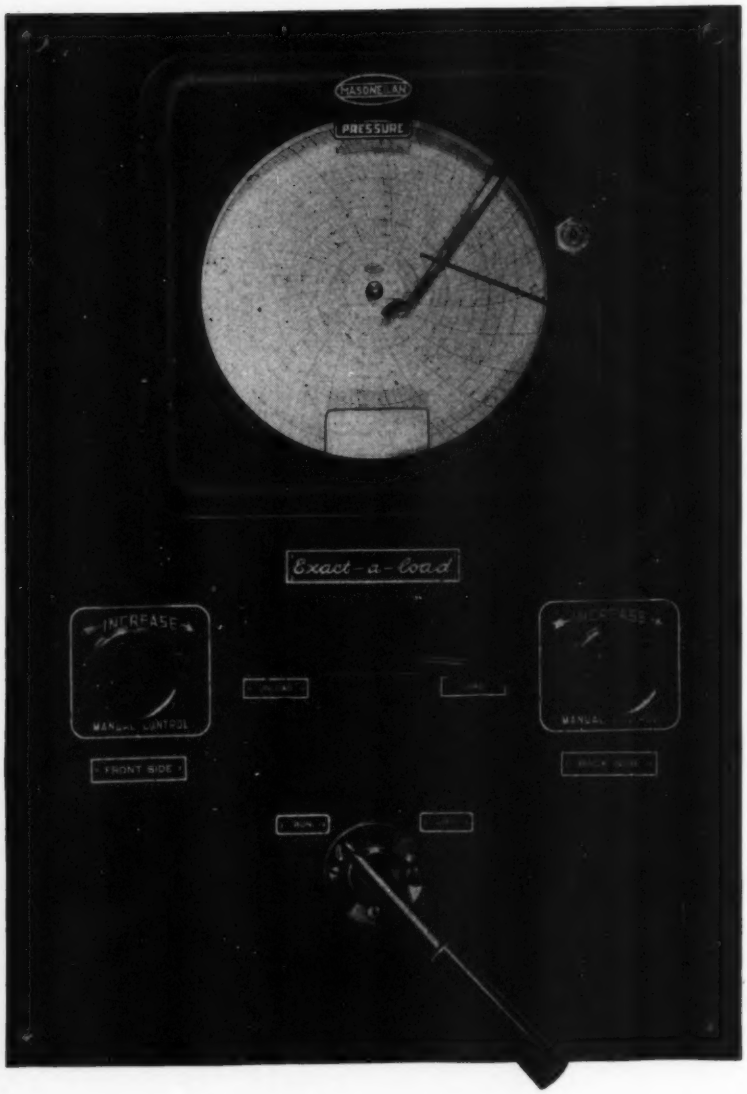

Exact-a-load Roll-Loading offers improved control, wide application and increased economy.

Used for pneumatic loading of wet presses, squeeze presses, calender and super-calender stacks, Exact-a-load enables you to produce—and duplicate—better quality paper, with fewer rejects and with reduced roll maintenance. Exact-a-load is easy to install and maintain—more than pays for its moderate initial cost in a short time.

And Here Is Why...

EXACT-A-LOAD SAVES TIME:

In loading and unloading the rolls.

In securing proper adjustment.

In keeping the operator informed at all times, by providing visible record of applied loading.

EXACT-A-LOAD SAVES PAPER:

By maintaining desired loading pressure on both front and back of the rolls.

By preventing damage to felt when crushes occur because of fast simultaneous unloading of both ends of the roll.

Available with diaphragm motor or air piston load applicators. Types for load and unload; or run and lift, or both. Take this forward step toward making your job easier, more productive; ask for your copy of Bulletin PD-102 and supplementary data.

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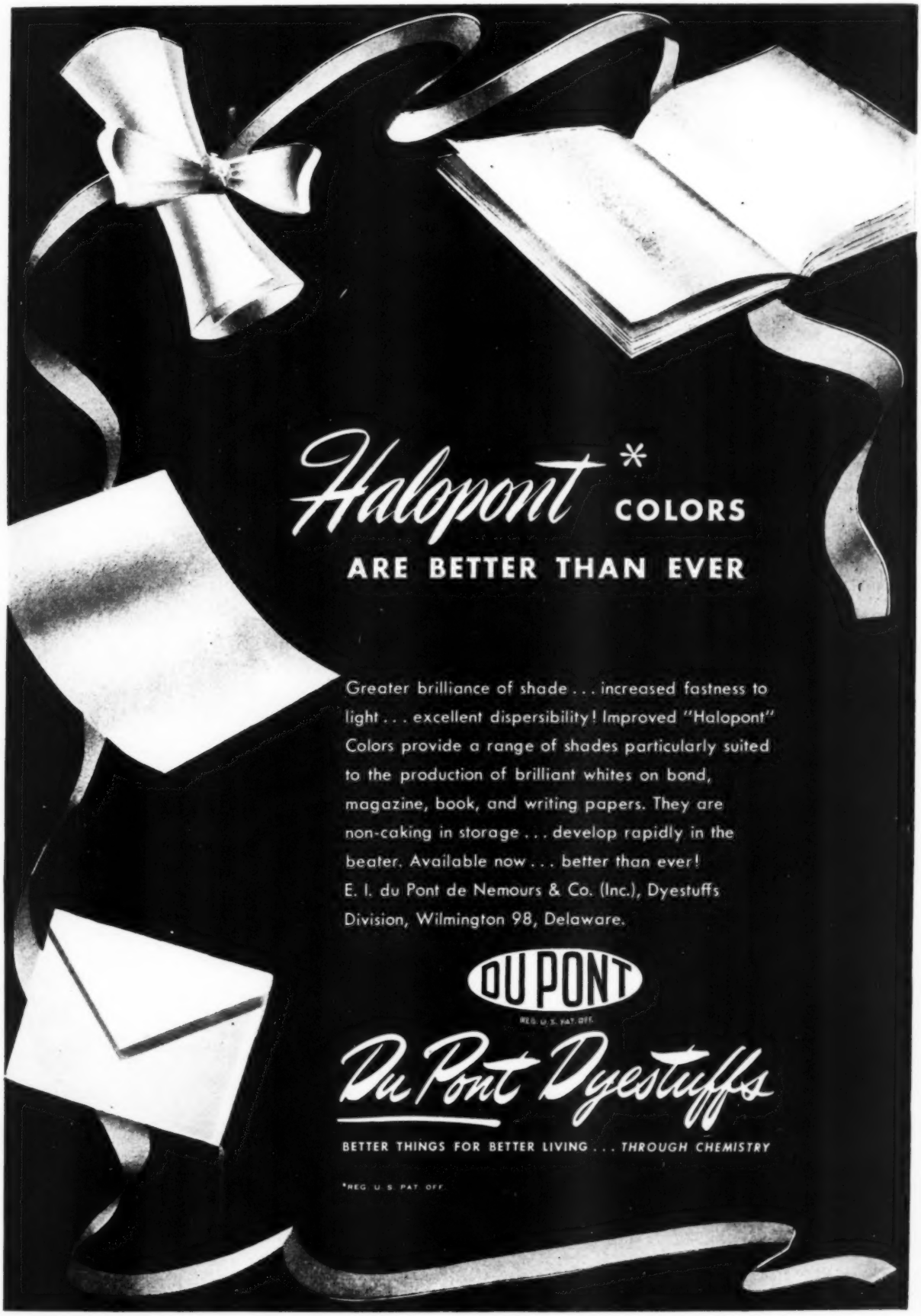
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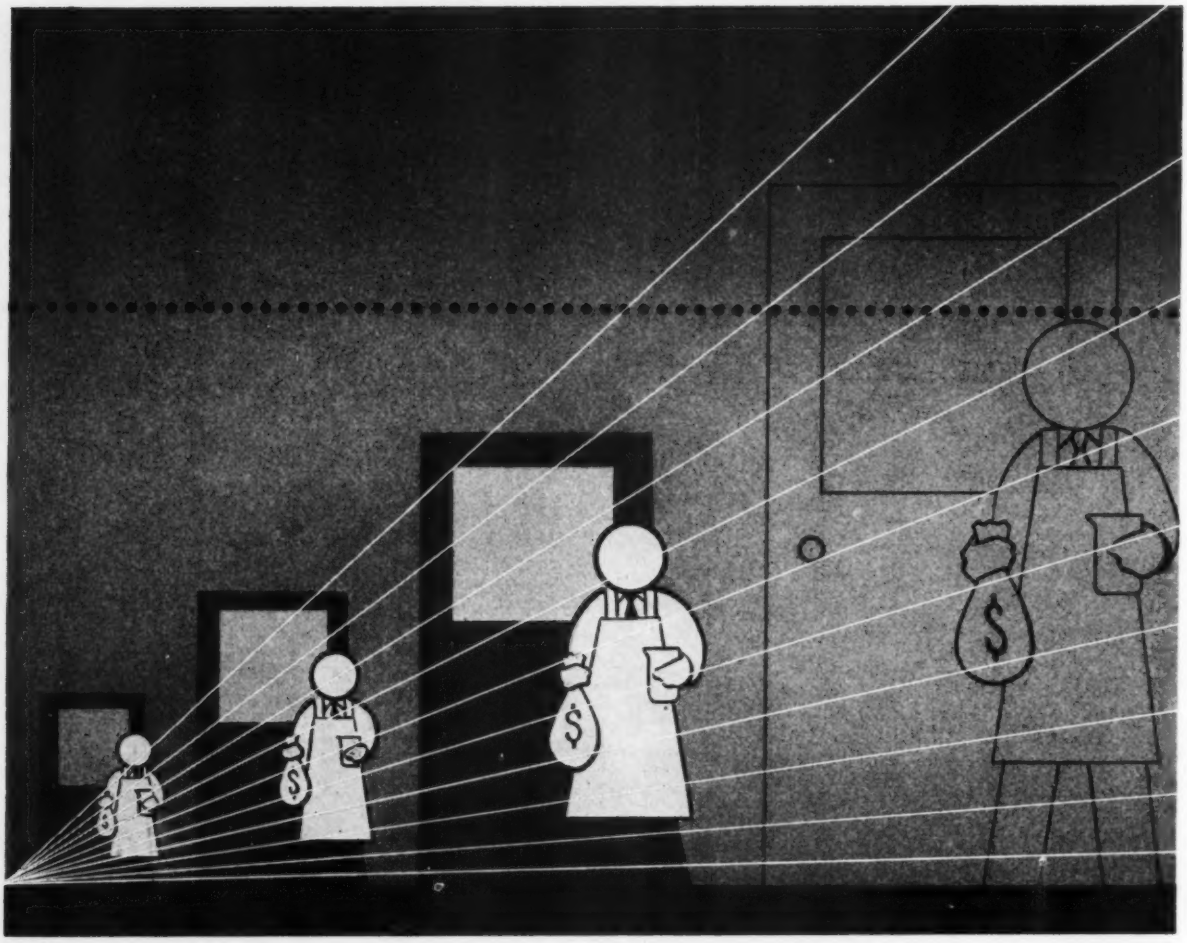


Expanded research develops new Monsanto plasticizers

The man-power and dollar-power devoted by Monsanto to research in the field of new plasticizers have both been expanded considerably during the past five years. As a result, new plasticizers now in development are far more versatile in their many applications — setting new standards of flexibility, volatility, burning rates, heat and light stability, permanence, electrical properties, abrasion resistance, elasticity.

For the time being these new plasticizers are not commercially available. However, field tests are being continued so that the performance characteristics and fields for use of these coming Monsanto products will be known by the time adequate production can be expected. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri . . . District Sales Offices: New York, Chicago, Boston, Detroit, Cleveland, Cincinnati, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

Present Monsanto Plasticizers

Arodors* • Dibutyl Phthalate • Diethyl Phthalate Dimethyl Phthalate • HB-40 • Ortho-Nitrobiphenyl Santicizer 8* • Santicizer 9* • Santicizer B-16* Santicizer E-15* • Santicizer M-17* • Santicizer 140* • Triphenyl Phosphate • Tricresyl Phosphate.

MONSANTO
CHEMICALS AND PLASTICS

*Reg. U. S. Pat. Off.

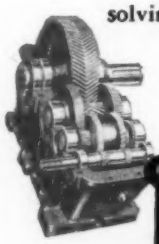
SERVING INDUSTRY . . . WHICH SERVES MANKIND

JONES DRIVES

for the Paper Industry

You will find Jones Speed Reducers and transmission products on important drives in paper mills in every section of the country. For nearly a half century the Jones organization has been working with the manufacturers of paper making machinery and with engineers in the paper industry, on a wide variety of drive problems.

As a result of these years of experience, the Jones organization has collected a vast amount of technical data relating to drives in the paper industry. This information is available either in the form of catalogs or in our files. You are cordially invited to make use of any of this material, or our services, in any way you feel might be helpful in solving your drive problems.



W. A. JONES FOUNDRY & MACHINE CO.
4439 Roosevelt Road, Chicago 24, Illinois

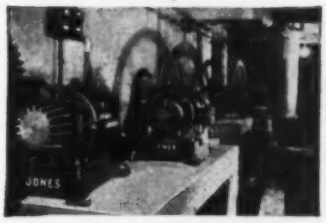
Jones

HERRINGBONE — WORM — SPUR — GEAR SPEED REDUCERS • PULLEYS • GEARS • V-BELT SHEAVES • ANTI-FRICTION PILLOW BLOCKS • FRICTION CLUTCHES • FLEXIBLE COUPLINGS

Jones herringbone speed reducer on a straw washer in a paper mill.

Wet end of sectional paper mill driven through a Jones herringbone speed reducer.

Vertical agitator in paper mill driven through a Jones herringbone speed reducer.



Group of agitator drives in a paper mill driven by Jones herringbone speed reducers.

Jones worm-helical speed reducer on a pulp tank drive.

Paper mill agitator driven with a Jones worm-helical speed reducer.

DETROIT PUBLIC LIBRARY

For Printing Inks

"So far and no farther," is what KELGIN tells printing inks when they reach the surface of paperboard that has been sized with this modern algin surfacing agent. So the inks stay where they are — dry and harden to the high gloss that makes a printer glad he's using your stock.

KELGIN sizing gives the sheet a dense, smooth surface and forms an ideal film barrier that effectively controls the penetration of printing ink oils and waxes. Faultless for water box application in the calender stacks, KELGIN will not produce foaming, prevents picking and sticking to the rolls. It is easy to handle, soluble in either hot or cold water.

KELGIN is a product of nature, free of impurities, rigidly processed to produce exact, uniform results. Our technical department will be glad to work with you on any of your surface sizing problems.

KELCO COMPANY

20 N. Wacker Drive, CHICAGO-6 | 31 Nassau Street, NEW YORK-5 | 530 W. Sixth Street, LOS ANGELES-14

Cable Address: KELCOALGIN—New York

WE HAVE AN UNDERSTANDING OF FELT

THAT WE CONVERT INTO **LOWER**

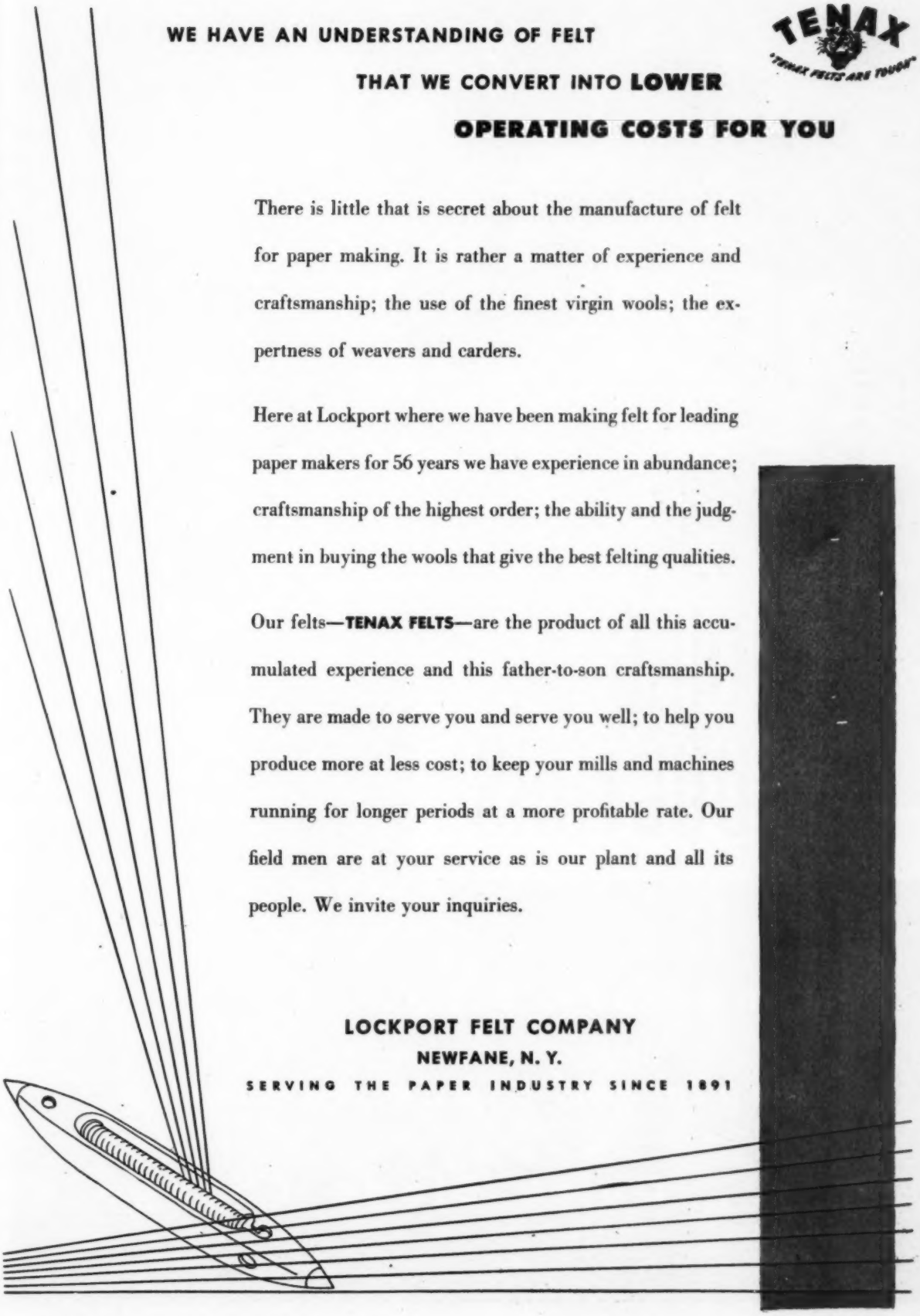
OPERATING COSTS FOR YOU

TENAX
"TENAX FELTS ARE TOUGH"

There is little that is secret about the manufacture of felt for paper making. It is rather a matter of experience and craftsmanship; the use of the finest virgin wools; the expertness of weavers and carders.

Here at Lockport where we have been making felt for leading paper makers for 56 years we have experience in abundance; craftsmanship of the highest order; the ability and the judgment in buying the wools that give the best felting qualities.

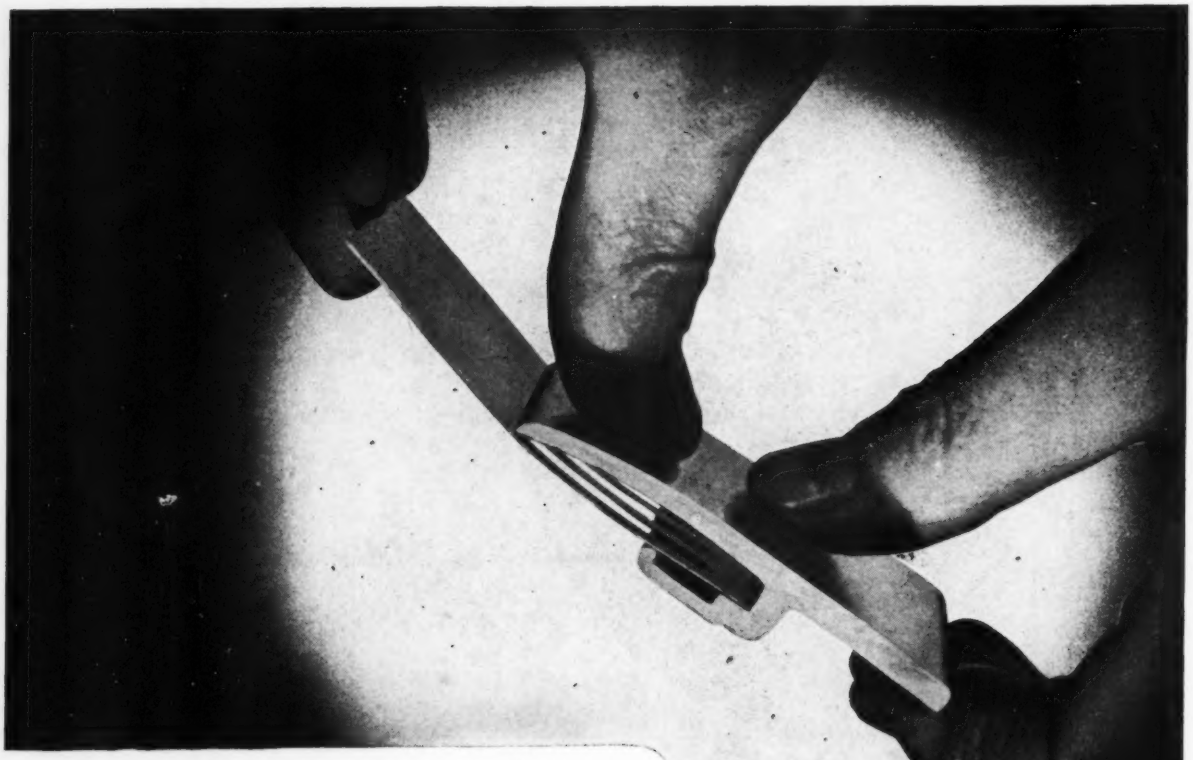
Our felts—**TENAX FELTS**—are the product of all this accumulated experience and this father-to-son craftsmanship. They are made to serve you and serve you well; to help you produce more at less cost; to keep your mills and machines running for longer periods at a more profitable rate. Our field men are at your service as is our plant and all its people. We invite your inquiries.



LOCKPORT FELT COMPANY

NEWFANE, N. Y.

SERVING THE PAPER INDUSTRY SINCE 1891

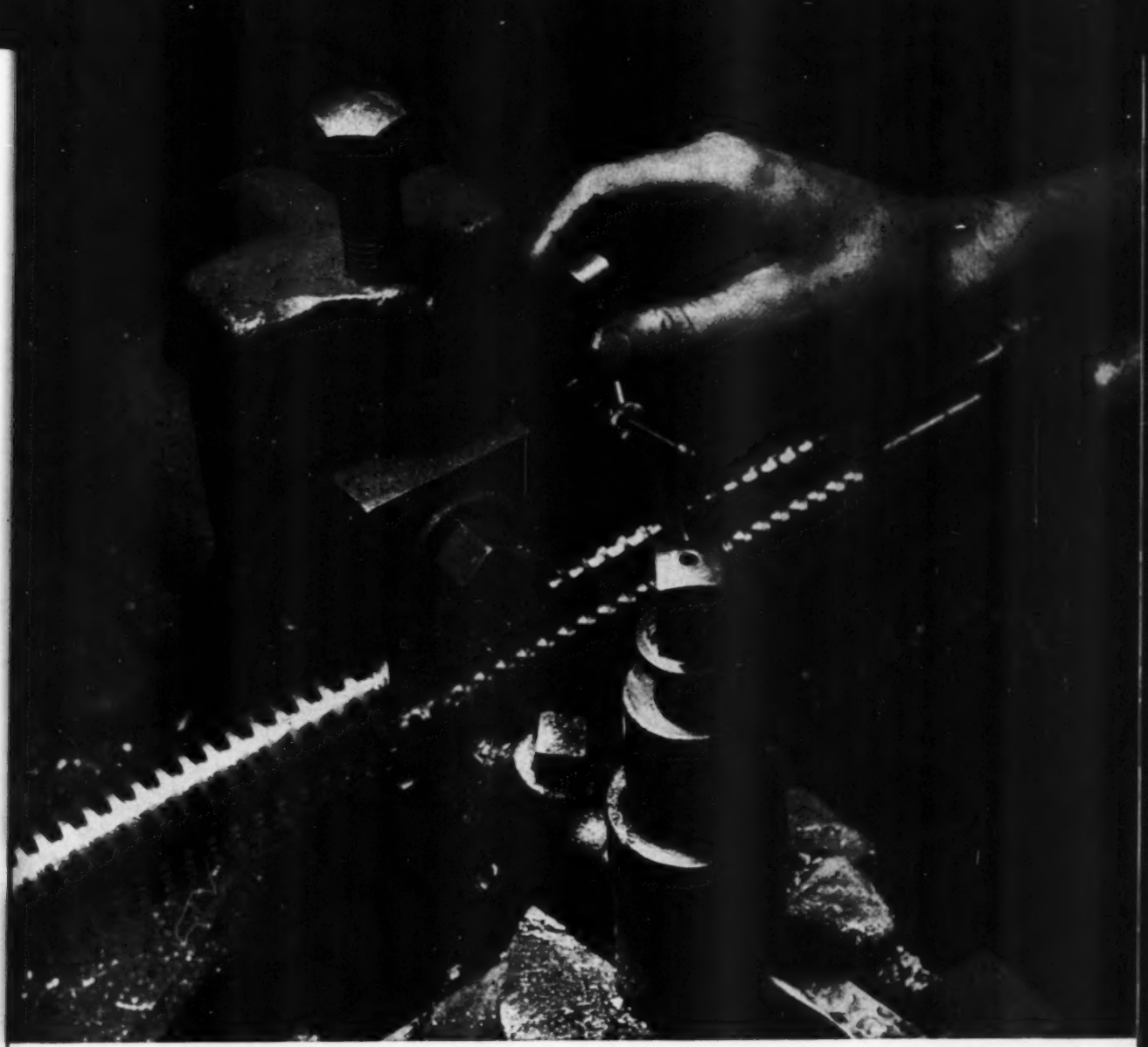


LODDING DOCTORS

Immediate Fit . . .

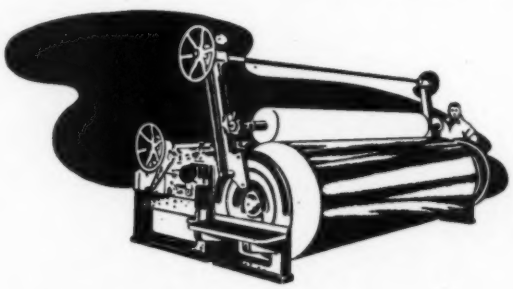
Minimum Blade Pressure

. . . Quick Blade Change



PRECISION

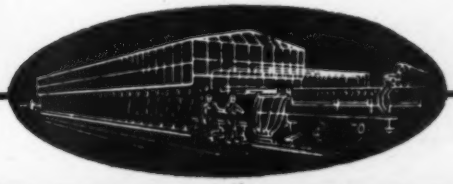
EXPERIENCED HANDS



The caliper in this workman's hand definitely illustrates the reason for the efficient functioning of Bagley & Sewall Paper Machines. "Precision" is a word that has real meaning in the Bagley & Sewall Shops. A decided emphasis on detail prevails. Possibly just a little more care is taken in the manufacture than may seem absolutely necessary, but the efficient production of paper on these paper machines proves the value of this exactness.

When considering new papermaking equipment, get in touch with our engineers.

BAGLEY & SEWALL



WATERTOWN, NEW YORK

THIS IS OUR TRADE MARK*

* REG. U.S. PATENT OFFICE

Appleton Woolen Mills

APPLETON • WISCONSIN

INCIDENTS FROM SMITHway PRESSURE VESSEL RESEARCH

PROJECT No. 71,074

Corrosion-resistant Smithlining can now be done with 21 different alloys

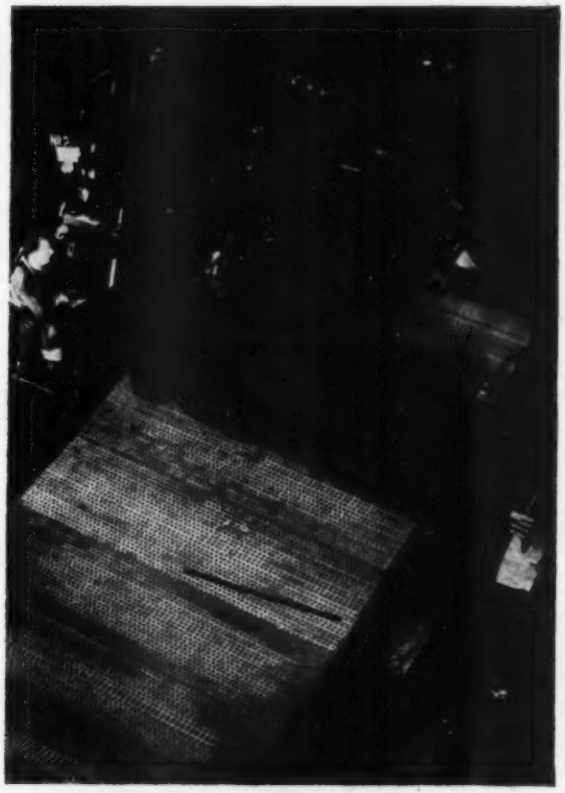
WHEN corrosion resistance first became important to the petro-chemical industry, Project No. 71,074 was started to develop a relatively low cost method of satisfactorily lining carbon-steel pressure vessels with a corrosion-resistant alloy.

Project 71,074 resulted in *Smithlining*, a patented process of resistance-welding sheets of alloy steels to a variety of steel base plates, and then forming into segments, cylinders, cones, or heads.

But Project 71,074 has never been closed out. It is still active. To date, it has made practical the use of 21 different alloys as linings. It has no size limitation. It provides for uniform alloy thickness to normal sheet tolerances, and permits two-surface inspection of both lining and base plates as well as chemical analysis and gauging of both.

Finally, it has permitted the successful application of lined vessels to a growing variety of corrosive services.

This unique combination of advantages gives Smithlining unusual appeal to all concerned with corrosive processing.



A. O. Smith-built resistance spot-welding machine, welding sheets of alloy steel to steel base plate.

A. O. Smith Research and Engineering Building, Milwaukee

A. O. SMITH Corporation

New York 17 • Philadelphia 5 • Pittsburgh 19 • Atlanta 3 • Chicago 4
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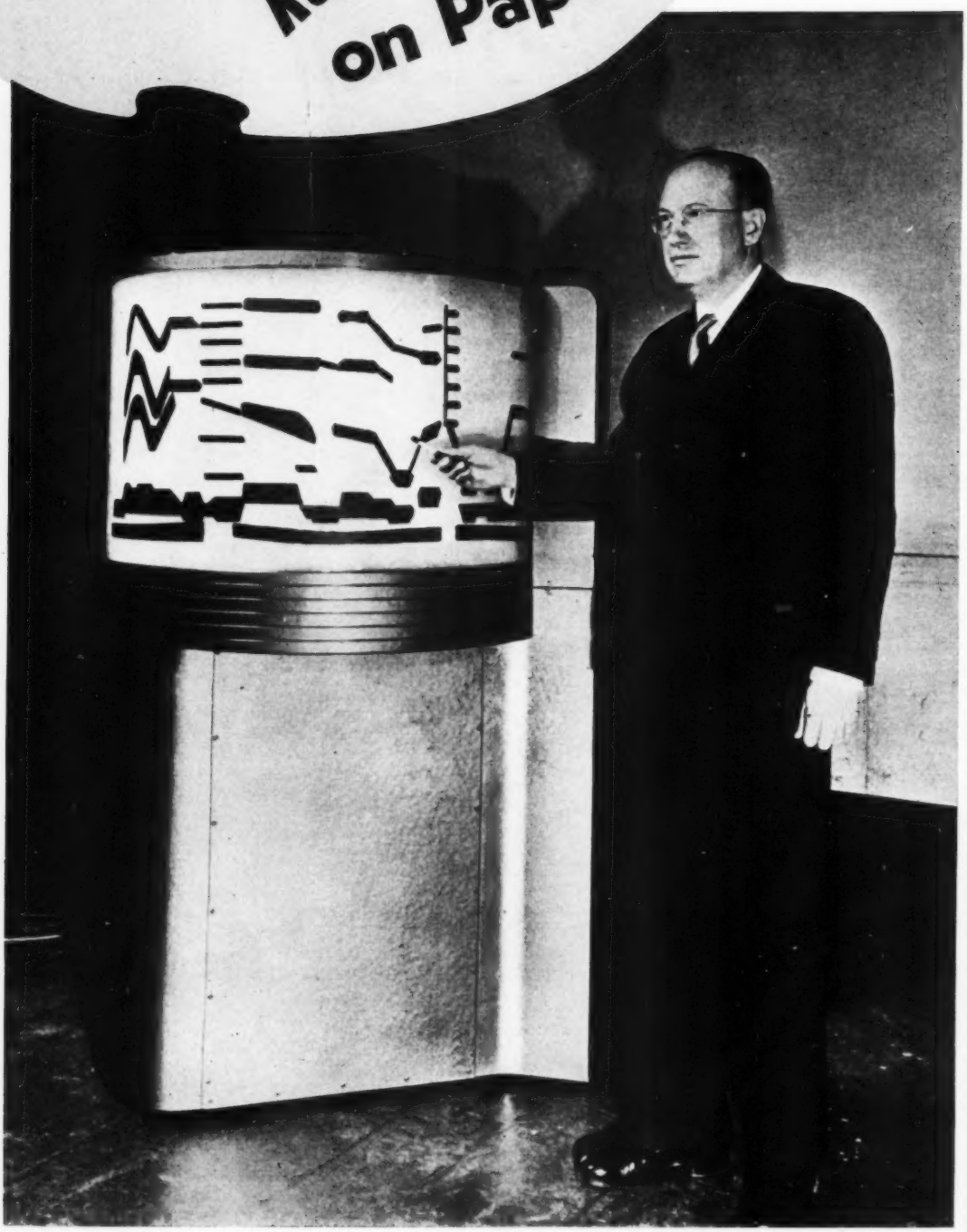
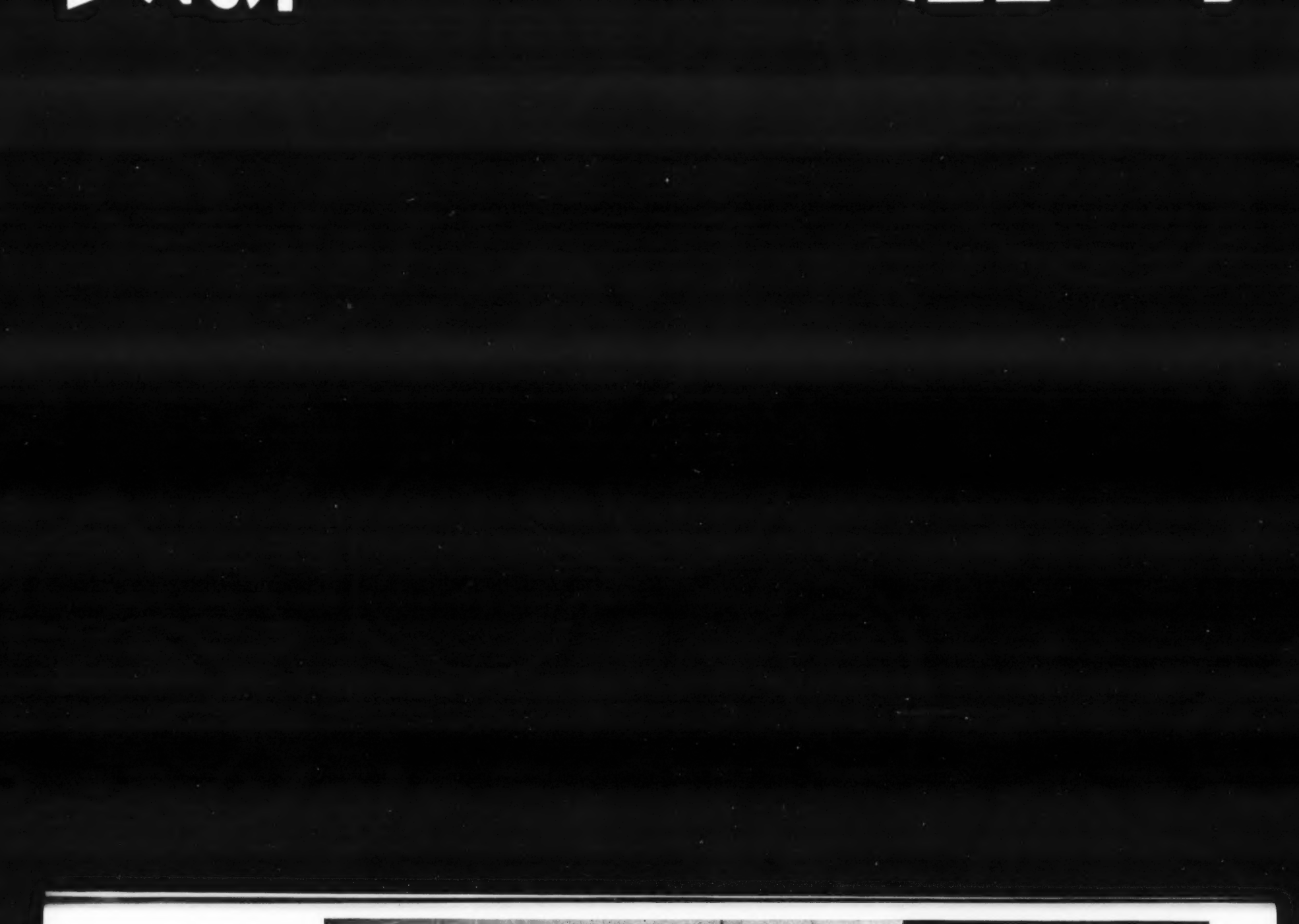
MAKERS OF AUTO FRAMES • PRESSURE VESSELS • LINE PIPE • OIL-WELL CASING • BREWERY TANKS
WELDING EQUIPMENT • TURBINE PUMPS • PETROLEUM METERS • AND OTHER PRODUCTS

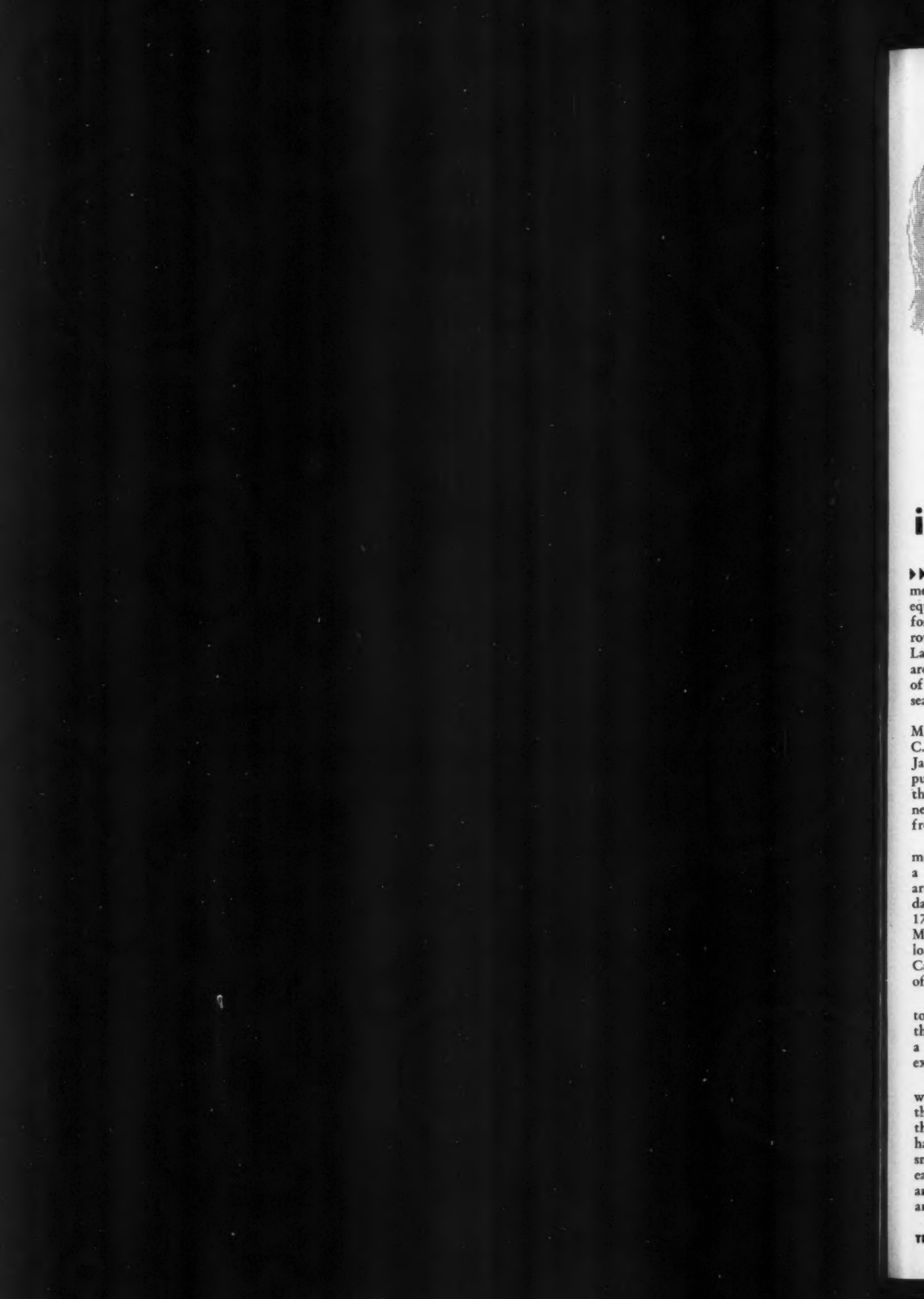
SPEECH Sounds Registered on Paper



See Page 36

Acme Photo





TRADE WINDS

Gathering Pulpwood in Northern Minnesota

A grapple-full of pulpwood destined for mills at Cloquet, where it will be made into matches and match boxes

▸▸▸ AIDED BY NEW developments in cutting and hauling tools and equipment, lumber men in the frozen forests of northern Minnesota's Arrowhead country from the shores of Lake Superior to the Canadian border are pushing out thousands of carloads of pulpwood during a short winter season.

One of the prominent figures in Minnesota's pulpwood industry is J. C. Campbell of Duluth. This winter, Jack Campbell's crews are cutting pulpwood from a section of land on the edge of Superior National Forest near Whyte, about 30 miles north from Two Harbors.

Campbell's crews, averaging 150 men and working from 40 to 48 hours a week in daily shifts of 10 hours, are cutting over 400 cords of wood daily and shipping between 16 and 17 carloads to the mills every 24 hours. More than 800 railroad cars will be loaded and shipped from the siding at Camp 30, near Whyte, before the end of the 60-day hauling season.

Pulpwood hauled from the forest to the siding during the first half of this year's season alone would make a pile 8 feet high and 8 feet wide, extending for 6½ miles.

Jack Campbell's operation started with the building of haul roads after the first snow and hard frost of the winter. Since the summer, the haul roads are 'dozed through the snow covered lowlands during the early days of winter. After brush and small growth has been removed, an ice road is built by compacting the snow with "cat" treads and spraying the surface with water. During the winter while logs are being run over the haul road to the siding, the ice road is constantly maintained by six tank trucks. Three pumps—Gorman Rupp, Rex and Jaeger 3-inch and 4-inch centrifugal—are required to provide the water for maintaining the roads. The haul roads are from 18 to 22 feet wide with enough room for trucks traveling in opposite directions to pass.

Logs cut in the woods are brought an average of 12 miles to the railroad siding with 12 trucks, 3 Chevrolets and 9 Fords, hauling 36 sleds which carry 7 cords minimum each load. The Chevrolets are equipped with Timken dual reductions and the Fords with Eaton 2 speeds axles. Some units have Truxmore trailing axles. Trucks average 7 trips each during the 10-hour work days.

In the woods, light timber is felled by hand while heavy timber is cut with three Disston power saws. The timber is hauled by horse and sled to bays along the road and cut with power saws to 100-inch bolt size. The timber is loaded to sleds in the woods and unloaded at the railroad siding with three Bucyrus Erie 10-B and 1 Lima Paymaster crane, all equipped with Williams grapples.

Sleds are unbuckled at the siding and spotted into place with two Caterpillar D4s, one Caterpillar RD4 and one Caterpillar tractor D6. Working on an assembly line schedule, the 'dozer equipped tractors pull loaded sleds into place alongside railroad cars

LEFT—A second unloading unit at the siding is this Lima Paymaster. The timber sled is spotted into place with the "cat" shown in this picture. . . . RIGHT—In the woods, timber is cut to 100-inch bolt size with power saws

at the same time they are nosing out the emptied sleds. The tractors and dozers are also used for maintaining the ice haul roads.

Bob Harris is superintendent for J. C. Campbell at Camp 30. This veteran northern Minnesota logger is an old-time woodsman who has seen the industry revolutionized by the development of modern tools and equipment. He not only has kept pace with the rapid changes in methods of cutting and hauling timber, but has kept a long step ahead.

Particular emphasis is laid on maintenance of equipment at Jack Campbell's Camp 30 near Whyte where cutting is under way this winter. Here a well equipped machine shop with electric acetylene welder and a complete line of small tools keeps the tractors, cranes and trucks in good working condition.

The cranes are all equipped with 5/8-inch load lines of preformed type wire rope. This type of wire rope instead of non-preformed is used because the cranes must be operated continuously through the comparatively short season. With speed an all-important factor, it is imperative that the crane load lines give long service without breaking. The money lost while just one wire rope break was being repaired would buy several more reels of preformed wire rope than are used during an entire season.

The spring breakup will find the J. C. Campbell camp closed down until next winter. The ice haul roads will melt away into the swampland and the only visitors to the mess halls and barracks will be a neighborly bear or two. But during the short, 60-day winter hauling season, pulpwood cut and shipped from this section of land on the edge of Superior National Forest will have filled more than 800 railway cars with material for paper pulp and much needed paper.

Bucyrus-Erie 108 unloads popple from sleds which haul more than 7 cords each load from the woods to the railroad siding

◆

IMPROVEMENTS UNDER WAY AT WOODFIBRE PLANT OF B. C. PULP & PAPER CO.

A large expansion program is under way at the British Columbia Pulp and Paper Company Limited, Vancouver, British Columbia.

Improvements at the Woodfibre plant, located on Howe Sound, include the installation of a hydraulic barking plant, log chipper, modern high pressure boilers, and additions to electric power generating capacity.

Both the Woodfibre mill and the company's other plant at Port Alice, on Vancouver Island, produce special quality dissolving pulp. The combined capacity of both mills is 135,000 tons a year. This present total production resulted from a $1,500,000 improvement program conducted by the company just prior to the war.

PAPER · · · America's 6th Industry

SHIP PERISHABLES IN PAPER ICEBOX

(NEWS ITEM: *Disposable paper iceboxes are being manufactured at the rate of 1,000 a day for shipping perishable merchandise.*)

Lobsters from Maine . . . orchids from Buenos Aires . . . and they traveled all the way in a paper icebox. A new throw-away container using dry ice refrigerant has been developed for shipping perishables by air, rail and truck. Lined with blanket insulation held in place by corrugated paperboard, this new portable icebox contains a metal-and-cardboard refrigeration unit that can be set to maintain temperatures from 50° F to -20° F. A waterproof bag placed inside the container holds the material being shipped.

Reprint of a 700-word article describing this new paper product is available for the asking.

Paper diapers . . . paper draperies . . . paper wash cloths . . . paper sheets . . . new uses for paper calling for new standards of lightness and toughness, new standards of quality in performance. New responsibilities — new opportunities for the Pulp and Paper Industry.

The Puseyjones Organization is now devoting itself completely to the design and construction of Paper-Making Machinery built to new high standards of speed and efficiency, and to the modernization of existing machines.

Among the new machines under construction by Puseyjones are three of the largest and fastest Fourdrinier Machines, one for white paper for bags, one for Kraft liner board, and one for Kraft paper for multi-wall bags; also one Cylinder machine of record size and speed for the manufacture of floor covering felt. Other machines are under construction for the manufacture of M. G. Kraft specialties, facial tissues, and high grade bristols.

During the next few months Puseyjones equipment will go into production in North Carolina, Massachusetts, Florida, Georgia, New York and California, as well as in Mexico and Sweden.

Puseyjones Engineers will welcome the opportunity to work with you in solving production problems.

THE PUSEY AND JONES CORPORATION

Established 1848. Builders of Paper-Making Machinery

Wilmington 99, Delaware, U. S. A.

THE SIGN OF SUPERIOR QUALITY

SORG COMPANY ANNOUNCES PLAN FOR RECAPITALIZATION

Directors of The Sorg Paper Company, Middletown, Ohio, have voted to make effective a recapitalization plan which was approved by the stockholders on February 28. The plan will be operative as soon as certificates of amendment are filed with the Secretary of State.

The plan provides the authorization of a new common stock issue of 176,908 shares at $10 par value and 22,114 shares of a new $100 par 5½ per cent cumulative preferred stock. No public offering is involved, but new shares would be exchanged for present stock.

In explaining the program, D. G. Driscoll, president of the company, explained that this program had become necessary by costs incident to expansion and modernization of the company's holdings. This covers the acquisition of the Port Mellon (B.C.) pulp mill by the company's affiliate, Sorg Paper Company, Ltd., also improvements made at the Middletown plant.

◆

AWARD SYSTEM AT SMITH PAPER MILLS HAS BROUGHT MANY HELPFUL SUGGESTIONS

Valuable suggestions are being received from employees under the cash award program inaugurated by the Smith Paper Mills, Lee, Massachusetts. A suggestion regarding pressure on a press lever brought an award of $90 for John T. Kennedy recently. Robert C. Munson, who already had received a partial award of $10 for a suggestion on an extra wind-up shaft, has been given a further award of $72.80.

Other awards were made for the following suggestions: Raymond Fillio, $24.58 for hook to lift hitch roll on a paper machine; James Navin, $10, for storage of stock in the beater room; Alexander Blache, $7.80 for a portable tool cabinet; Richard Dacey, $5 for removing sets from a paper machine.

◆

FINANCIAL

▶▶▶ THE GENERAL DROP in securities prices which followed upon the announcement of United States plans for aid to Greece and Turkey in conflict with Russian ambitions was accompanied by a moderate drop in industrial securities. The effect on paper mill securities, however, was moderate, no doubt their strong tendency being based on striking profit statements issued by the various companies for 1946 operations. International Paper Company's earnings rose, for instance, from $8,500,000 in 1945 to over $31,000,000 in 1946. St. Regis Paper Company more than doubled its 1945 earnings of over $2,000,000, and many other companies, as shown in details given below, reported more than twice or even three times their 1945 earnings. Sales were heavy, but much of the increase was due to the release from special wartime excess profits taxes.

American Writing Paper Corporation—Net income for 1946 was $305,818 as against $150,610 a year ago.

Brown Company—Net income for the year ending November 30 was $1,593,982 as compared with $1,219,808 for the previous fiscal year.

Certain-teed Products Company—Net income in 1946 was $4,323,269 as against $1,353,303 in 1945.

Container Corporation of America—Net income in 1946 was $7,165,561 as compared with $2,026,103 in 1945.

Crown - Zellerbach Corporation — Net profit for nine months ended January 31 was $9,780,340, as compared with $5,706,189 for the comparable period in the previous fiscal year.

Dixie Cup Company—Net profit in 1946 was $1,268,016 as compared with $1,019,677 in 1945.

Eddy Paper Corporation—Net income in 1946 was $2,925,484 as against $848,284 in 1945.

Robert Gair Company, Inc.—Net income, not including Canadian subsidiary, was $2,295,624 as compared with $714,691 a year ago.

Hinde & Dauch Paper Company—Net income in 1946 was $1,749,877 as compared with $999,067 in 1945.

Hoberg Paper Mills, Inc.—Net income in 1946 was $414,273 as compared with $145,195 in 1945.

International Paper Company—Net profit for 1946 was $31,179,048 as compared with $8,546,078 in 1945.

Marathon Corporation—Net profits for the quarter ended January 31 were $1,130,837 as compared with $757,665 in the comparable quarter of the previous fiscal year.

Masonite Corporation—Net income for six months ended February 28 was $1,933,972 as compared with $1,148,370 in the same period a year ago.

Minnesota and Ontario Paper Company—Net income for the year 1946 was $2,190,207 as compared with the net income for the year 1945 of $1,549,042.

Nashua Gummed & Coated Paper Company—Net income in 1946 was $693,883 as against $478,611 in 1945.

National Container Corporation—Net income for 1946 was $5,605,896 as against $1,185,920 in 1945.

National Vulcanizing Fibre Company—Net income in 1946 was $1,412,405 as compared with $561,477 in 1945.

Oswego Falls Corporation — Net profit in 1946 was $1,405,822 as against $334,962 a year ago.

Puget Sound Pulp & Timber Company — Net income for 1946 amounted to $1,320,507 in comparison with $602,624 for 1945.

Rayonier Incorporated—Changing from a fiscal year to a calendar year basis, net income for eight months ended December 31 was $2,500,944 as compared with $1,503,379 for the comparable period in 1945.

St. Regis Paper Company—Net income in 1946 was $5,563,604 as compared with $2,211,411 in 1945.

Scott Paper Company—Net income in 1946 was $2,019,614 as against $1,756,205 in 1945.

Soundview Pulp Company—Net income in 1946 was $1,900,544 as against $717,379 a year ago.

Union Bag & Paper Company—Net earnings in 1946 were $5,254,953 as compared with $1,646,467 in 1945.

S. D. Warren Company—Net income in 1946 was $1,597,370 as compared with $461,256 in 1945.

New York Stock Exchange—Stocks

	Closing Prices Mar. 25	Feb. 25
A.P.W. Products	5½	5⅝
Celotex	28⅝	30⅛
Same Preferred	20⅜	*21½-22
Certain-teed Products	16⅜	18⅝
Champion P & F Co.	22⅞	25½
Same Preferred	*109-110	*109½-110½
Container Corp.	41½	46⅜
Cont. Diamond	11¼-11½	12⅛
Crown Zellerbach	28 1/9	30⅜
Same Preferred	107	*107-108⅜
Same $4 Preferred	116	119
Dixie Vortex	31¼	33½
Same "A"	53½	52¼
Robert Gair Co.	6⅝	7⅜
Same Preferred	*20¼-20½	19½
Gaylord Container	17½	17⅞
Same Preferred	*103-108	*100-115
International Paper	46	49
Same Preferred	*103⅝-105	*104-104¾
Kimberly-Clark	24¾	27
Same Preferred	108½	114
McAndrews & Forbes	*36-37	*37½-38½
Marathon	24½	27⅛
Masonite	51½	55¼
Mead Corp.	20½	22⅛
Same Preferred	102½	103
Same 2nd Preferred	*46½-48	48½
National Container	38⅛	38
Paraffine Cos.	70	79
Same Preferred	*108½-112	*108-112
Rayonier Inc.	23	22¼
Same Preferred	37¼	37
Scott Paper	*42⅞-48	46
Same Preferred	99¾	100
Sutherland Paper	43½	45⅜
Union Bag & Paper	29⅞	32⅜
United Paperboard	16½	18
U. S. Gypsum	102	102
Same Preferred	*192-197	202
United Wall Paper	8¾	9¾
Same Preferred	*48-51	*51-53½
West Va. P & P Co.	41¼	42½
Same Preferred	*112-113	112

New York Stock Exchange—Bonds

Celotex 3½%	104	....
Champion P&F Co. 3%	....	....

New York Curb Exchange—Stocks

Am. Writing	8½	9¼
Great Northern	42	41½
Hummel-Ross	....	31¼
St. Regis	9	9⅝
Taggart	....	8⅞

*Closing Bid and Asked Prices.

THI

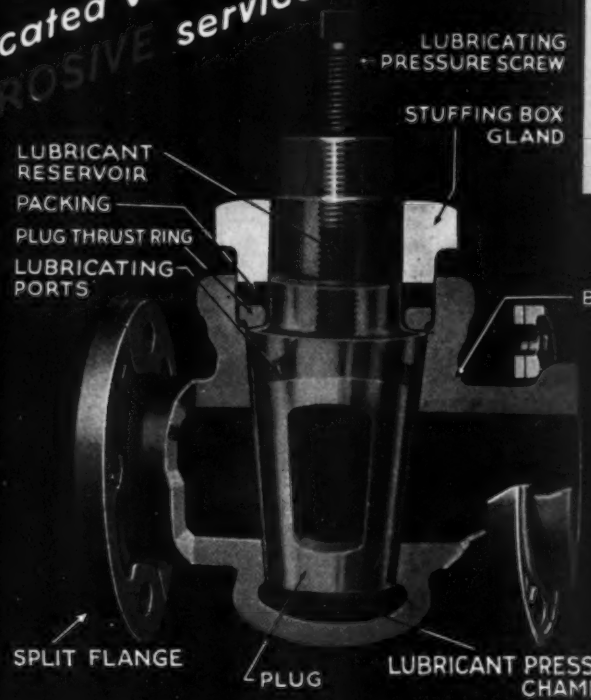
INSIDE STORY

of a lubricated valve for CORROSIVE service

HOW THE VALVE OPERATES

The screw in the stem forces lubricant through the channels of the plug into the reservoir and pressure chamber at the bottom of the body. A turn of the pressure screw lifts the plug hydraulically from the seat for easy turning, at the same time forcing lubricant from the grooves over the seating surface. The resiliency of the acid-resisting packing returns the plug to its normal position.

Turn-stops prevent exposure of the lubricant channels to the liquid.



This look inside a Durco top lubricated plug valve tells the story of permanent, through-and-through corrosion-resistance.

Every part of the valve in contact with corrosive solutions is of Duriron or Durichlor. These Durco high silicon irons have almost perfect resistance to the corrosive action of most commercial corrosives. Durichlor has much greater resistance to hydrochloric acid and chlorides.

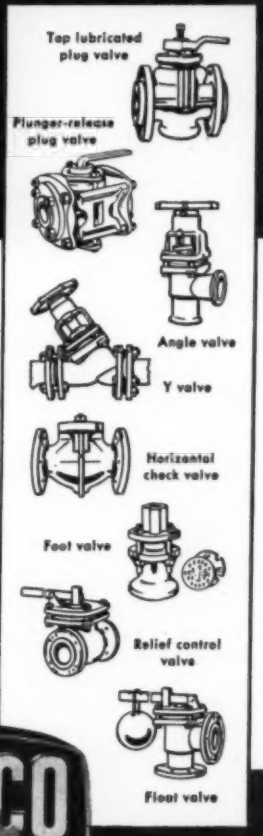
These valves are especially suited for muriatic acid and other corrosives having no lubricating properties.

Valves available: Standard straight-way type. Sizes 1", 1½", 2", 2½", 3", 4", and 6". Also available in 3-way, 2-port and 3-way 3-port.

For complete details ask for your copy of bulletin 617.

DURCO Adv. 27-GM

CORROSION-RESISTANT DURCO VALVES



THE DURIRON CO., INC.
DAYTON 1, OHIO

DURCO
CORROSION RESISTING ALLOYS & EQUIPMENT

BINDING PROTECTION against mold and decay

DOWICIDES make cordage last

Many manufactured products used in farming—like other materials that must be protected from mold and decay—attest the preservative value of Dowicides.

Sisal twine, for example, is widely used in hay balers. And harsh sisal fibers must be lubricated with warm oil to twist properly in twine-making machines.

Dowicides, added to this cordage oil, protect the finished twine. For several years the Dowicides have been used successfully for this purpose.

Many kinds of fibers—cotton, jute, sisal, hemp—now receive Dowicide protection. And it's the same kind of protection that Dowicides give—to products and processing materials alike—in the paper, cordage, leather, paint, lumber and other industries hampered by mold, termites and bacteria. If these destroyers are your problem, ask Dow about Dowicides today.

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit
Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle
Chemical of Canada, Limited, Toronto, Ontario

CHEMICAL COMMENTS

Dichlorodiphenyl Oxide Stops Attacks of Ambrosia Beetle in Green Lumber

Chemical control of Ambrosia (pin-hole) Beetles is offered by Dichlorodiphenyl Oxide. Attacks by the beetles, which bore into green timber and freshly sawed lumber of many hardwoods, are stopped by the chemical, and prolonged protection is given. An oil solution or a water emulsion may be applied to the freshly cut lumber with any type of hand or mechanically operated pressure sprayer. Since Dichlorodiphenyl Oxide mixes readily with inexpensive light oils of the kerosene range, and presents no handling difficulties, treating solutions are easily prepared locally.

Paints Made from Saran F-122 Latex, an Ingredient Forming a Tough Protective Film in Paint

The protection of a plastic film is afforded by water-base coatings made with Saran F-122 Latex . . . In this new Dow material, millions of particles bond themselves together to form a tough protective film, even on wet surfaces . . . coatings made with Saran F-122 Latex are superior to average paints in their resistance to moisture, grease, oils and chemicals . . . Applied with either brush or spray to wood, fibreboard, metal or masonry, they dry extremely fast into a long-enduring gloss finish . . . Paints containing Saran F-122 Latex are practical for both home and industrial use, particularly in the maintenance field.

Improved Ink Gloss Follows Sizing of Paper Surface with Methocel

Penetration of printing ink is minimized by a light coating of Methocel, and the gloss and brightness of inks or varnishes subsequently applied is noticeably improved. Applied as a surface sizing at the water boxes of the calendar stack, Methocel deposits a film possessing a high degree of adherence to paper or paperboard. And, on waxing stock, a light prime coat of Methocel greatly reduces the penetration of paraffin, and maintains the opacity and whiteness of the original stock.

50th Anniversary 1897-1947

DOW

CHEMICALS INDISPENSABLE
TO INDUSTRY AND AGRICULTURE

Washington

THE PAPER SITUATION

▶▶▶ THE PAPER SHORTAGE has been the subject during the past month of congressional and other governmental investigations in a variety of fields. Here are the highlights of recent developments.

1) A New York Federal Grand Jury has begun the investigation of price fixing of newsprint, admittedly originating in Canada.

2) The Senate Small Business Committee conducted hearings to seek the reasons for shortages of newsprint.

3) A House of Representatives committee has been named to probe into shortages of other papers, as well as newsprint. Hearings have not begun as yet.

4) Department of Agriculture efforts are being devoted to exploitation of Alaskan forest areas, with bids soon to be asked from two companies proposing to spend approximately $20,000,000 each in building newsprint mills in that area.

The New York Grand Jury investigation will cover several weeks, and no details will be announced pending final action by the Grand Jury after witnesses have been heard. The investigation will be high-lighted by vigorous legal battles. There is no question in the minds of the government authorities that the increases in newsprint prices were initiated in Canada. However, the Government is endeavoring to strike at the manufacturers by the claim that heavy Canadian newsprint interests are subsidiaries of United States corporations. On the other hand, it is expected that United States witnesses and counsel will take the position that the setting of prices in Canada is outside the control of the United States through its antitrust laws, which are ineffective as regards corporations in other countries. The Government is expected to counter this defense by some form of action against the sales agencies of Canadian companies in this country, chiefly in New York City. This preview of the Grand Jury investigation is, of course, unofficial as in Federal Grand Jury investigations the only information given the public is the names of witnesses as they appear. It is apparent, however, that a tough legal battle has been joined.

In Washington, meanwhile, the Senate Small Business Committee held prolonged hearings on the newsprint situation. Witnesses representing United States and Canadian manufacturers, and large and small newspapers were heard. The committee appeared to be making a serious effort to learn the real facts in the picture, not to heckle them or to make them targets of oratorical attack.

As a result of the hearings, a committee of large publishers has offered to co-operate with the committee in formulating a plan for providing relief for small publishers who have been unable to get the paper they desire or require. Possibly the clearest exposition of the economic picture was given by R. E. Canfield, Counsel for the American Paper and Pulp Association when he told the Senate Committee that the problem was one of excess demand by publishers rather than short supply. He said that the present situation was a development of the price program of the publishers in past years, which resulted in driving the industry to Canada where it was free from under control by American anti-trust legislation. It developed that at least part of the problem of the small publishers was due to maldistribution under which some dealers diverted ordered tonnage from contract customers to take advantage of the necessities of small users. With a base price of $84 for newsprint, it was testified that thousands of tons had been delivered to small users at prices ranging up to $250 per ton. One company netted nearly half a million in profit by such diversions.

While the Senate Committee was conducting this investigation, plans were being laid for a parallel investigation by a House of Representatives committee, which will not only study newsprint shortage, but shortages in other grades.

While Congress and Department of Justice officials are carrying out this part of the program, the Department of Agriculture has announced that its negotiations for the establishment of a newsprint industry in Alaska are nearing a head. Bids soon will be asked for timber from the Tongass National Forest in Alaska, the bidders to be given contracts for purchase of wood for papermaking for a fifty year term. Two companies are said to be interested and planning to expend approximately $20,000,000 each. The program will be elaborate, for the building of mills in the Tongass area will first of all require the establishment of new towns in what is now wilderness. The Department of Agriculture has for years been urging the utilization of Alaskan wood by paper companies, but existing paper companies had never been convinced that the potential profits would justify the financial risk. It is not known whether the prospective bidders for this timber are affiliated with existing paper companies.

CONGRESSIONAL STUDY OF RECIPROCAL TRADE BEGINS

Two Congressional Committees have begun study of the Administration's Reciprocal Trade Agreement program. The Senate Finance Committee has been taking testimony on the International Trade Organization proposed charter, which is to come before an international conference opening at Geneva April 10. Sharp criticism has already been manifested of any program to commit the country to a definite program without ratification by Congress.

Meanwhile, the Ways and Means Committee of the House of Representatives has begun hearings, questioning Department of State and other Department officials on the general Reciprocal Trade Agreement program. It has been reported that this committee may eventually lay down a statement of policy, with warning to the Administration that its negotiation of trade agreements will be closely checked and that further action may be taken if reductions are carried to an extreme.

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▶▶▶ PULP PRICES ARE going up. Canadian mills have announced an increase of approximately $10 per ton, to bring export prices up to the Canadian home market price. Sweden has taken pulp off the list of commodities under price control, and Swedish manufacturers are expected to police their own export operations to hold any increases to not more than $25 per ton. Meanwhile Sweden has initiated a vigorous program to balance its trade by restricting imports and spurring exports, particularly of pulp.

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INTERNATIONAL PAPER SALES RAISES PRICE OF NEWSPRINT

Effective April 1, the Canadian International Paper Sales Company increased the price of newsprint $6.00 per ton. This increase applies to customers both in Canada and the United States. It brings the price up to $90 a ton, New York basis, and to $86 a ton in Canada. The $4.00 represents the "historic differential" which has existed attributable to the difference in transportation costs.

The latest increase represents a continuation of a marked upward trend in the price of newsprint, which has been taking on an accelerated pace in the past year or more. This is the fifth increase since the beginning of 1946. In October (1946) the price went up $10 a ton. Last July there was an increase of $6.80 per ton when the Canadian dollar was raised to parity with the U. S. dollar.

The present price of $86 a ton in Canada marks an increase of $29 a ton, or 51 per cent since the beginning of last year. It is 87 per cent ($40) a ton above the prewar price of $46 a ton.

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GOODWILLIE INSPECTS NEW FOURDRINIER-YANKEE PAPER MACHINE AT VANCOUVER

The new paper machine built by Beloit Iron Works for Westminster Paper Company, Vancouver, British Columbia, has been installed.

This machine is said to be the most modern and high-speed machine of its type in western Canada. It is a fourdrinier-Yankee machine, and will be used for glazed papers and tssues of various sizes.

J. E. Goodwillie

The new machine room at the Westminster company's plant was in readiness when the first of nine carloads of machine parts arrived in Vancouver. The erection job was handled without delay, and in mid-March J. E. Goodwillie, sales engineer of Beloit Iron Works, went to Vancouver to check the alignment of the machine and auxiliary equipment. While there, Mr. Goodwillie supervised trial runs on the machine which will go into full production during April.

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IMPORTS

According to a report by Warren B. Bullock, manager of the Import Committee of the American Paper Industry, imports in January showed a marked rise in tonnage of various grades of paper imported from Europe, some at low values. Groundwood paper from Finland, totaling 200 tons, was valued at $69 per ton, and similar paper from Norway at $66, as compared with a price for Canadian paper of $97.50 and $92 for Newfoundland. Strawboard from Holland totaled 300 tons, at a value of $74, and glassine from Finland was priced at 9.8 cents per pound for 13 tons. Nearly 1,000 tons of solid wood pulpboard was imported from Finland, at a value of $72 per ton. Netherlands shipped 100 tons of a high priced paperboard, valued at $175 per ton. Seattle received a shipment of 28 tons of tissue paper valued at 11.7 cents per pound.

Mr. Bullock also points out that the annual report of the Export Import Bank plans an expansion of its operations by granting government credit to facilitate import as well as export trade. These credits may be extended as follows:

1) To foreign organizations
2) To United States citizens to finance production abroad by American-owned corporations
3) To United States citizens to make payments for imports

The report states that useful and economically desirable imports should be stimulated by all appropriate means.

Meanwhile, the bank has authorized a new loan to Finland of $2,500,000 to finance sales promotion for Finnish products in the United States. This is in addition to an earlier loan of $20,000,000 earmarked for development of the Finnish wood using industries, including pulp and paper, for increased export trade.

Five shipments of Jananese Yoshino tissue paper, averaging about 100 reams each, have been received at New York through the agency of the United States Commercial Corporation, a marketing subsidiary of the Reconstruction Finance Corporation. The United States organization has as its Japanese agent the Board of Trade of the Imperial Japanese Government, "Boe Ki Cho," which is co-operating in the shipment of Japanese goods to the United States to facilitate payment of the occupation costs of the American army. The paper was offered to the highest bidder.

A gypsum board with thin layer of paperboard on each side has been imported from Canada and is before Customs officials for classification. The question is whether it is a paperboard laminated with an adhesive and dutiable at $14.50 per ton, or as a manufacture in chief value of gypsum at 35 per cent.

Thirty-six cases arising at Jacksonville, pending in the courts since 1939, have been decided in favor of the importer's claim that the material is dutiable at the actual selling price, and not at the higher market value in Sweden. The Court held that the Swedish manufacturers had set up a form of price control which enabled the importer to pay duty on a lower valuation than the current Swedish prices. Eighteen of the cases involved kraft paper and six sulphite wrapping.

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BRITISH PAPER NOTES (February, 1947)

As we write these notes, the British Paper Trade is trying to assess the damage caused to the industry by the recent coal crisis. Particularly are printers and other paper consumers anxious to discover the possibilities of obtaining paper in the near future.

As this month coincides with the end of the 23rd licensing period, many orders placed for the latter part of this period have not been executed and according to official instructions are not to be carried forward to the new licensing period, consequently, a certain amount of tonnage has definitely been lost.

The opening of the new period is overshadowed by the fact that although permission has been granted for electrical power to be used in the lately restricted areas, all industries have not found it convenient to restart immediately although every possible effort is being made to get the machinery of industry moving as quickly as possible. The general feeling is to forget the past three weeks and concentrate on the future. This may result in an entirely new spirit in industry with far-reaching effects.

Happily the picture as far as the paper trade is concerned is not all black for a considerable number of mills are situated in Scotland, particularly the esparto mills, and these have not been so seriously affected by the crisis. Most have been able to keep going and as there are plentiful supplies of both straw and esparto grass available some little leeway may be effected in this quarter.

As to the mills in Britain, they generally are in a mess. The majority have had to close, but here again, given a real break in the weather, they should be moving shortly.

A certain amount of paper has been saved by the return of newspapers to the war size of four pages and the stopping of the publication of all weekly journals for two weeks. Coupled with this, quotas for various sections of the trade have been decreased for the new period. Among the immediate results of this move is a famine in stationery. As printers and bookbinders have also been closed, it will

How to carry
MORE POWER
over your lines

Power factor improvement—just one of the operating advantages of E-M Synchronous Motors—removes a burden from your power line. Synchronous Motors, in addition to driving their connected mechanical load, supply magnetizing current to offset the low power factor of induction motors and other equipment. Large-power Synchronous Motors may often be added to existing lines and transformers without raising kva to a level requiring larger feeders, transformers and control equipment.

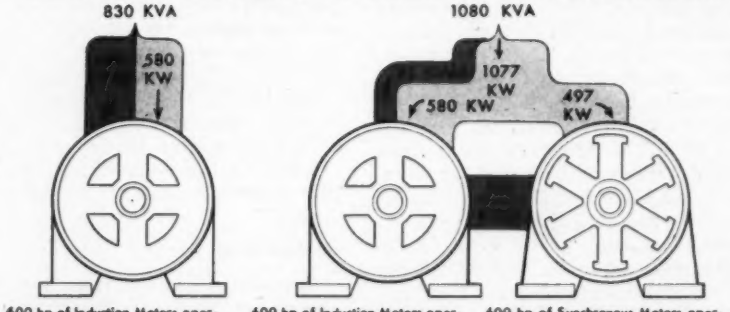
Because transformers and distribution lines are limited in their kilowatt capacity by the total kva they must carry, Synchronous Motors—by furnishing leading kilovars—replace lagging kilovars in the line with kilowatts for useful work. Providing your own leading kilovars, rather than buying them from the power company, usually results in reduced power billing. As a further benefit, steady voltage is maintained on a higher level than would be the case at a lower power factor.

Besides these savings and advantages, E-M Synchronous Motors give you constant speed, wide range of speed ratings, high stability under voltage dips. It's this double-duty performance that makes them the most efficient drive in industry.

● One of five E-M Synchronous Motors applied to air conditioning fans to improve power factor in a large engine gear plant in Indiana. The motors are 60 hp, 1200 rpm.

● Both of these 500 hp, 180 rpm Synchronous Motors operating air compressors at Motor Products Corp., Detroit, Mich., feature power factor correction at 0.7 leading pf.

POWER FACTOR MAKES A DIFFERENCE



600 hp of Induction Motors operating at 0.7 lagging power factor —580 KW, 830 KVA, 590 KVAR.

600 hp of Induction Motors operating at 0.7 lagging power factor —580 KW, 830 KVA, 590 KVAR.

600 hp of Synchronous Motors operating at 0.7 leading power factor— 497 KW, 711 KVA, 507 KVAR.

In the system operating at low power factor the lagging kilovars carried by the line may equal or exceed the kilowatts doing useful work.

Addition of Synchronous Motor drives to this system permits doubling the horsepower capacity, with only a 30% increase in kva.

A2033

1897 OUR 50th YEAR 1947

Send for 20-page illustrated booklet, "The ABC of Power Factor."

ELECTRIC MACHINERY MFG. CO.

Minneapolis 13, Minnesota

be appreciated that paper production and consumption practically have ceased for a period, thus the position is in many respects very little worse than before the crisis although naturally some loss has accrued. It simply means that the entire trade has stood still for a time.

The real test will come when it is discovered what the government's intentions are towards the paper trade in respect to coal allocations. Past experience has shown that the government has very little respect for the trade despite the fact that it is continually calling upon it for supplies to satisfy its two million civil servants. Incidentally, the government's publication, *Board of Trade Returns*, is among the several publications well overdue as a result of the crisis.

The general treatment of the paper trade during the war years and since lends support to the urgency of the paper trade publicity campaign which is now being attempted. While paper is in such short supply and demand so heavy it is difficult to make the members of the trade appreciate the necessity of a publicity campaign.

The recent reduction of newspapers to four pages is another retrogressive step. It had been expected that the early spring would have seen these papers raised to six pages daily but now it will probably be some months before there is a return to even five pages per day. Yet not a single voice has been raised in protest. This ready acceptance in the downward trend in living standards is ever present. Efforts to obtain further supplies from overseas are countered by lack of money yet it is doubtful if the home mills will produce as much newsprint this year as they did last for like all mills they are suffering not only from a lack of coal but also fibrous materials, chemicals and the rest. In fact, long before the coal crisis these other shortages were affecting production seriously.

It is probable that the outcome of the present trouble will be that many mills will follow the example of the Carrongrove Paper Mills at Denny, Stirlingshire, and replace steam power by Diesel. The output of this mill is well over 300 tons of plain and coated papers per week and in these days it is essential that production is maintained as far as possible.

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▶▶▶ A MILLION-DOLLAR paper bag plant will be constructed at Tacoma, Washington, by the St. Regis Paper Company. The announcement was made on March 18 after the company had received approval for the project from the CPA.

UNANNOUNCED BUYERS HAVE OPTION ON HAWLEY COMPANY

An announcement from Portland, Oregon, on March 27 states that undisclosed buyers are negotiating to purchase the Hawley Pulp & Paper Company, Oregon City, Oregon.

The company's annual notice to stockholders carried the statement that "an option for a substantial majority of the common stock of the company is presently outstanding, and if such option is exercised," copies of the option agreement will be sent to all stockholders who will "have the privilege of turning in their stock for exactly the same price and terms as specified in such option agreement."

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ITALIAN PAPER NOTES

(February, 1947)

▶▶▶ THE COMMERCIAL and industrial conditions in Italy have been improved through the arrangement of a large U. S. Loan, a purchase of gold effected with the New York Federal Bank by the Bank of Italy, the 100 Liberty ships that will soon be at the disposal of Italy for traffic with foreign countries, the signing of peace between the Allies and Italy, and other encouraging arrangements. Meanwhile, exchange of goods and direct purchases are strong, and there is every probability that this situation will continue for the reason that many valuable contracts have been arranged.

Negotiations with England by Minister Luciano Mascia show favorable prospects for an exchange of goods that will move freely notwithstanding restrictions imposed through international conditions. Since January 1, this year, books could be shipped into England without licenses with the exception of periodicals and romances in English, cement, raw iron leagues, coppy and cobalt, musical publications, and commercial documentations.

Italy has settled and renewed commercial accords with nine foreign countries: Austria, Poland, Spain, France, Belgium, Holland, Denmark, Norway, and Sweden.

Italian Cellulose Imports

The new Swedish-Italian commercial accord permits annual imports of 95,000 tons of cellulose. The amount would have been greater except for the reasons that the Swedish production was only 75 per cent of capacity of the plants, and the country's production had increased considerably.

In Sweden the normal annual consumption of paper is now expected to be 80.90 kilos per person, or a total of 500,000 tons. In normal times, this consumption would represent about 9 kilos per person.

Twenty tons of cellulose covered by the new accord will be used by Italy for paper; 75,000 tons will go to the rayon industry which always has been the heaviest importer of cellulose. The additional amount of cellulose needed for paper to reach the 250,000 tons per year of prewar times, will need to be imported in 1947 from Czecho Slovakia, Austria, Finland, Germany, and, possibly, from America and other countries.

The insufficient production of the world and the increased demand for foreign cellulose have brought a higher purchase price. In Italy this increase is much more felt through the devalorization of the lira that has brought the cost 100 times above that of 1939. On the other hand, the production of cellulose in Italy has not been increased sufficiently to meet the additional need. It is doubtful that it will be, especially as the country's consumption of paper must necessarily be increased to reach the consumption of paper in other countries. The plants installed for the purpose before the war can only produce limited quantities, even when worked to capacity, and there is no capital available for building new plants unless American financiers become interested.

Italian Printing Inks

During the peak years of the past, the demand for printing inks in Italy was very strong and the industry developed quite extensively. It was, therefore, in position not only to supply its own need but to handle a large amount for export. Although a number of these plants are still operative, production has been curtailed because of an insufficient supply of raw materials. The output of these plants at present hardly covers the Italian markets—which markets also are limited because of a scarcity of paper.

Italian Wall Paper

Because of damages from bombardments, the Italian wall paper industry has renewed its activity with vigor. But this market also feels the shortage of paper. Resultant increased prices have brought the limited amounts of paper offered from time to time up to such a high point as to be practically prohibitive even though the manufacturer sells at a reduced profit. For this reason, the lowest qualities of wall paper are quoted at prices that are far beyond those of some foreign offers. The principal Italian wall paper plants are centered in a few localities. Important firms are located in Milan, Rome, Turin, and Naples.

St. Regis Paper Company

reports on 1946

Sales and Earnings at New High

	1946	1945
Net Sales	$82,782,186	$52,500,824
Net Profit	$ 5,563,604	$ 2,211,411

Properties Acquired in 1946	Additional Annual Capacity
Pulp and paper mill at (Cantonment) Pensacola, Fla.	42,000 tons of kraft pulp and 59,000 tons of kraft paper and paperboard
Pulp and paper mill at Pensacola, Fla.*	90,000 tons of kraft pulp and 86,000 tons of kraft paper
Pulp and paper mill at Bucksport, Me.	112,000 tons of pulp and 100,000 tons of printing and publication papers
Paper mills at Kalamazoo, Michigan	80,000 tons of printing and publication papers
Pulp and paper mill at Little Falls, Minnesota	10,000 tons of pulp and 12,000 tons of printing and publication papers
Paper mill at East Pepperell, Mass.	35,000 tons of kraft paper and kraft specialties

195,000 acres of Southern timberland

400,000 acres of timberland in Maine

*Under construction by company in which St. Regis has an interest.

Plant Expansion	Additional Annual Capacities
Multiwall bag plant at Pensacola, Florida (Under construction)	50,650 tons
New and enlarged bag plant facilities at Vancouver, B. C.; Dryden, Ont., and Cap de la Madeliene (Three Rivers), Quebec	20,000 tons
$6,000,000 program at Deferiet, N. Y. mill (largely completed)	30,000 tons of printing and publication papers
$2,000,000 program at Trenton, N. J. plastics plant (completed)	10,000,000 lbs. of Panelyte plastic

Development of Products, Markets and Methods of Production

Bleaching of sulphite and groundwood pulps by St. Regis patented procedure

Application of coating material to the surface of paper as it is being manufactured on paper machines

Panelyte drip baffle plates for refrigerators

Summary of Consolidated Income for the Year Ended December 31, 1946

Net Sales, Royalties, and Rentals	$82,782,186.06
Cost of Sales and Expenses	74,118,642.88
Operating Income	8,663,543.18
Income Credits	1,443,445.00
Gross Income	10,106,988.18
Income Charges	582,546.28
Net Income Before Provision for Federal and Foreign Income and Excess Profits Taxes	9,524,441.90
Provision for Federal and Foreign Income and Excess Profits Taxes	3,785,207.87
Net Income Before Deduction of Minority Interests	5,739,234.03
Deduct Minority Interests in Income	175,630.47
Net Income	$ 5,563,603.56

One-piece Panelyte door frames and breaker strips, with hidden fastening devices attached, for refrigeration

Decorative Panelyte for table tops, bars, furniture

Multiwall paper bags adapted for new fields (over 400 commodities now being packed)

Multiwall paper bags . . . expansion within existing markets

New mechanized bag-making equipment

Looking Forward

A full twelve-month operation of original and newly acquired properties is expected to increase the sales volume for 1947 to more than $110,000,000. Completion of plans for plant modernization and installation of mechanized high-speed equipment will increase manufacturing efficiency with resulting economies. The unity of interest between labor and management was furthered during 1946, and the personnel of recently acquired mills is being rapidly merged into the St. Regis organization. The Company's products continue to supply the needs of the customers engaged in twenty-one basic American industries.

DIRECTORS:

J. H. Allen, J. O. Bulkley, T. H. Cosford, W. DeLong, W. K. Dick, W. J. Dixon, R. K. Ferguson, M. F. Ford, E. R. Gay, H. R. Lamb, H. S. Lewis, H. E. Machold, C. R. Mahoney, R. B. Maltby, C. B. Martin, J. A. Quinlan, W. H. Vorsfelt

ST. REGIS PAPER Company

230 PARK AVENUE, NEW YORK 17, N. Y.

NEW YORK • CHICAGO

BALTIMORE • SAN FRANCISCO

IN CANADA: St. Regis Paper Co. (Can.) Ltd., Montreal

PRODUCTS: St. Regis "Tacoma" bleached and unbleached sulphate pulp . . . Multiwall Bags and Bag-filling Machines . . . Printing, Publication and Specialty Papers . . . Panelyte—The St. Regis Structural Laminated Plastic.

SPEECH SOUNDS ARE NOW RECORDED ON PAPER TAPE

One of the latest developments of science and a sensational new use for paper is paper tape on which the human voice is recorded magnetically.

A strong fiber-type paper is used, and the machines are serviced with spools of paper tape made one-fourth of an inch wide and 0.002 inch thick.

So far, two systems of processing the paper have brought satisfactory results: (1) the paper is treated with an iron-base substance for ready magnetization; (2) the paper is coated with a paint, the pigment of which is a powdered ferro-magnetic material.

Numerous advantages are claimed for the use of paper tape over wire, which is now being introduced for recording, also by magnetization. It is said that a spool of paper tape will cost approximately $1.50 for a half-hour of recording. Wire costs upward of $5 for 30 minutes of recording.

Like the wire, paper tape can be demagnetized and re-used.

See the illustration on page 24 of a demonstration before the National Geographic Society by Dr. Oliver E. Buckley, president of the Bell Telephone Laboratories. As the drum rotates past photoelectric cells, the black paper patterns interrupt the light and cause the cells to send out signals that register speech sounds. The visible speech symbols constitute a sort of shorthand of the human voice.

◆

PAPER CORP. OF AMERICA BUYS PULP MILL IN SWEDEN

The purchase of a pulp mill in Sweden by Paper Corporation of America, New York City, has just been announced. The acquisition of this plant was negotiated notwithstanding a Swedish law which forbids the sale of industries owned by Swedish citizens to foreigners.

This is explained by reason of a discovery made by Lawrence Lesavoy, president of Paper Corporation, while on a trip to Sweden last fall in search of new pulp supplies. While there he learned that although the Tegefors pulp mill at Jarpen, Sweden, appeared to be owned by a Swedish bank, actually the bank only operated it, and ownership was held by a group of Norwegians and British who had acquired it prior to the enactment of that law. He was able to buy from these foreign interests not only the plant, but also 75,000 acres of land including extensive timber limits, farms, lakes, rivers, and even the village of Jarpen itself.

Recently, Paper Corporation took over the plant of Amoskeag Paper Mill Company, Manchester, New Hampshire. The company also owns a plant located at Cheboygan, Michigan. It is understood that Paper Corporation has further plans for expansion, but just where has not been disclosed.

Lawrence Lesavoy is president of the company; Murray is treasurer and chairman of the board, and Robert LeRoy is executive vice president and general manager.

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NEW RAIL PROJECT UNDER WAY IN MINNESOTA—WILL REACH REMOTE TIMBERLANDS

Preliminary work on the first major railroad construction project in Minnesota since 1915, and one which will be of inestimable value to the wood pulp industry, got under way late in March at Two Harbors, Minnesota.

The rail line will tap uninhabited wilderness areas north of Two Harbors and will penetrate an area in which the U. S. Forest Service a year ago opened to selective timber cutting. Most of the trees in the area are pulpwood, and officials of the railway which is constructing the new line state that the movement of timber over the line is expected to exceed 100,000 cars annually.

◆

MILPRINT ACQUIRES PLANT AT STOUGHTON, MICHIGAN

The operations of a new plant just completed at Vancouver, Washington, by Milprint, Inc., will be directed by Charles A. Westberg, of Milwaukee. The Vancouver plant will supply paper wrapping materials for northwestern fishing and fresh fruits industries.

Milprint also has leased the Nelson muffler plant No. 1 at Stoughton, Wisconsin, for the manufacture of coated paper products. It is expected operations at the Stoughton plant will start about May 1. The company expects to expand the plant on an adjoining site.

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DU PONT INTERESTS WILL BUILD TEMPORARY CONTAINER PLANT AT HOUSTON, TEX.

The construction of a $2,000,000 container manufacturing plant at Houston, Texas, by the Alfred I. du Pont estate interests has been announced.

A temporary plant, to cost between $500,000 and $600,000 will be erected immediately on property leased from the Southern Pacific Railroad. This plant will be operated by the St. Joe Paper Company (Port St. Joe, Florida) while another site is being selected for the larger, permanent plant.

The announcement of this project was made by W. T. Edwards, vice president of the St. Joe Paper Company, who with Edward Ball, president of the company, had been conferring with the Houston Chamber of Commerce and the railroad company for some time past.

Mr. Edwards stated that a full complement of the most modern box-making equipment would be set up in Houston before July 1. All classes of kraft corrugated boxes and containers will be produced.

The preliminary plant will be of sufficient capacity to convert approximately 3,000 tons of liner-board and corrugated sheets into finished containers each month. Raw materials will be shipped to Houston from the St. Joe plant.

◆

UNITED PAPERBOARD FORMS FOIL LAMINATING DIVISION

The formation of a foil laminating division at the Victory Mills (New York) plant of United Paperboard Company has been announced. This division will operate under the name of United Laminating Corporation.

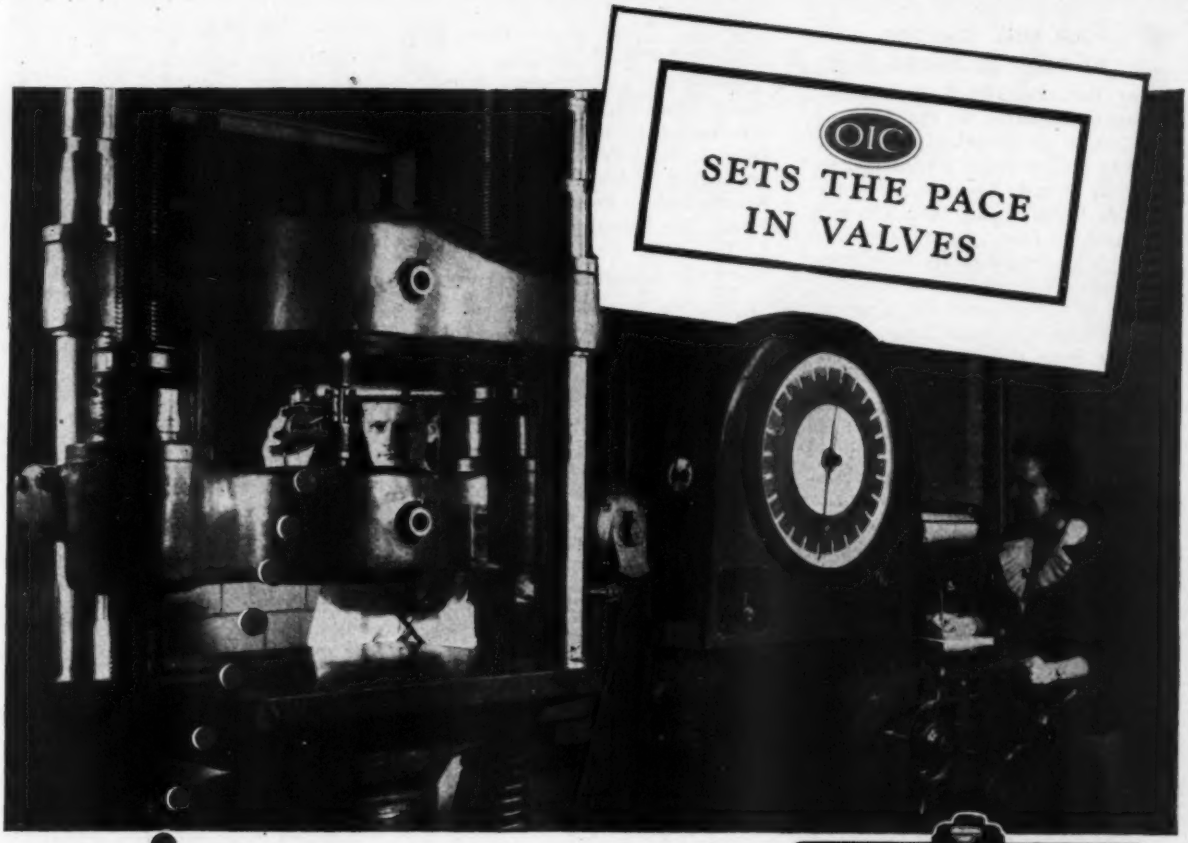
At the new plant, foil will be laminated to all types of board, as well as paper, and protective and decorative coating also will be applied to board and paper. Some of this material will be available for the converting trade and the balance will be converted in United's own plants at Victory Mills, Syracuse, Cohoes (New York), and Springfield (Ohio).

◆

BATTELLE WILL SELECT NUMBER OF APPOINTEES FOR RESEARCH TRAINING

During the summer or fall of this year, Battelle Memorial Institute will appoint a limited number of predoctoral Fellows and postdoctoral Associates to conduct investigations of a fundamental character in the Battelle laboratories. This is part of a training program which has been in operation at Battelle since 1931.

Fellows and Associates are brought together for a year's "internship" at Battelle for the purpose of training research men, primarily for careers in industrial research. Appointees devote their full time to their own research projects in the Battelle laboratories under the guidance of the Battelle technical staff. The projects must be of a fundamental or general nature, leading to the discovery of scientific principles or the gathering of significant new data. The findings are to be prepared for publication as a service to science and industry.



THEY'RE S-T-R-E-T-C-H-I-N-G YOUR VALVE DOLLAR

"How far will a bar of steel, iron or bronze stretch before it breaks?" That's the $64 question that OIC engineers answer with the huge hydraulic testing machine, pictured above, when they give *every* new run of metal a tough "physical exam." Modern equipment such as this and high standards throughout the up-to-date OIC plant assure you top value, great safety, long service for your valve dollar! You can fit your installations exactly with the many sizes and types of OIC steel, iron and bronze valves. Write for *free* catalog. Just drop a line to The Ohio Injector Company, Wadsworth, Ohio.

SEE YOUR OIC VALVE DISTRIBUTOR

MODERN TEST METHODS are pictured in the new OIC sound slidefilm from which the above photo was taken. See this helpful film to learn more about modern valve construction and usage. *No cost or obligation.* Write today for a showing right in your place of business.

OIC VALVES

STEEL • IRON • BRONZE

0-247-3

NEW PULP MILL STARTED AT PORT EDWARDS, B. C.

The Port Edwards Celllulose Co. Ltd., a subsidiary of the Celanese Corporation of America, has started a fifteen-million-dollar project at Port Edwards, British Columbia, for the development of a pulp mill. The mill will produce from 200 to 400 tons of highly purified cellulose daily with operations solely in North America.

Hon. E. T. Kenney, Minister of Lands in Canada, states that a large tract of forest land north of Prince Rupert will be set aside by the Government; one of the first forest management licenses issued in British Columbia. "It will be the first big arrangement whereby government and business combine forces to perpetuate timber resources by scientific management and at the same time maintain a continued supply of timber for industrial purposes," said Mr. Kenney.

The mill site is located on Watson Island, about eight miles from Prince Rupert on the north line of the Canadian National Railways. Ocean steamers already serve the area by docks built by the U. S. Army.

◆

ST. JOE PAPER COMPANY WILL ADD NEW TURBINE

Work has been started on a half-million dollar addition to the plant of St. Joe Paper Company, Port St. Joe, Florida. This addition is a building which will house a new 6000-kw. General Electric turbine unit.

The installation of this turbine will insure a more continuous operation of the plant. This turbine, or one of the other two already in operation, will act as an auxiliary which will mean that it will not be necessary for the plant to shut down at any time for a complete turbine inspection, as has been the case in the past.

The work is being done by Merritt, Chapman & Scott Corporation. It is expected the addition will be finished by late summer.

◆

PAPER SCHOOL AT C-W DIV. GRADUATES 18 STUDENTS

The four-year course of the Crown Willamette Division paper school at Camas, Washington has been completed by eighteen students. The diplomas were presented recently after a banquet given in their honor by the Crown Zellerbach Corporation.

Dr. A. L. Strand, president of Oregon State College, was the speaker, and A. R. Heron, vice president of Crown Zellerbach, presented the diplomas. J. E. Hanny, resident manager of the Camas mill, gave the address of welcome, and A. G. Natwick, dean of the paper school, presented some special awards.

Graduates were: Thomas Bennett, Henry Ostenson, Harland Clodfelter, Harold Coe, L. A. Coleman, Laurence Dungan Sr., Edward Franklin, Robert Fuller, Glen Gunderson, Jack Krank, Talbert Preuitt, L. F. Russell, Henry St. Lawrense, Lester Schatz, L. E. Semke, Fred Schick, William Scott and Charles Wheeler.

◆

CENTRAL PAPER COMPANY'S NEW LAB IS COMPLETED

The completion of Central Paper Company's new Development Laboratory has been announced by C. W. Smith, president and general manager of the company. The new building adjoins the company's main office and is fully equipped for all types of pulp and paper products development. It consists of a special chemical laboratory, a general chemical laboratory, and a general paper laboratory devoted to practical testing of papers under exact usage conditions. Also, there is a fully equipped pulp and color laboratory, scale and microscope room and a constant humidity room for paper testing.

The director of the new laboratory is Gavin H. Mullen, who for the past twenty years has been associated with the company and was recently in charge of the physical testing laboratory and products promotion. Assisting Mr. Mullen will be research chemist William Winey, chemical engineer John Hirschle, and laboratory assistants Mrs. Selma Subler and Stephen Kowalski.

◆

LONGVIEW FIBRE GETS CPA APPROVAL FOR OFFICE BLDG.

Plans for construction of additional paper storage facilities have been announced by the Longview Fibre Company of Longview, Washington. The cost, already approved by the Civilian Production Administration, is estimated at $125,000. A $24,000 addition to the office building has also been granted.

Starting in 1927 with one machine, the company now has five machines with an out-put of 500 tons daily. The plant employs 1,600 persons and approximately 5,700 carloads of finished products are shipped yearly.

◆

FIRST STEP COMPLETED IN I-P EXPANSION PLAN AT TICONDEROGA MILL

With the erection of a seven-story brick building which houses "recovery" apparatus, termed the most modern setup of its kind in the paper industry, the first step in a major construction program at the International Paper Company Mills, Ticonderoga, New York, has been completed.

The new building has been under construction for the past year. Babcock & Wilcox Company installed a new boiler. It has been learned that the second step in the new development at the mill is now under way with ground broken for another building which will house a new boiler plant adjoining the new recovery structure.

◆

▶▶▶ A PARCHMENT building and warehouse will be built at a cost of about $250,000, according to a report emanating from Columbia River Paper Mills, of Vancouver, Washington.

◆

SCHOOL FOR ENGINEERS FOUNDED AT SAULT STE. MARIE BY ABITIBI CO.

A school founded on the principle of replacing the missing generation is the latest undertaking of the Abitibi Power & Paper Company.

This new unit in the company's educational program is an engineering school at Sault Ste. Marie. It is built on the idea that graduates of universities in many instances still have to acquire the practical experience and skills which would have been theirs now if there had been no war and no depression. Two-thirds of the new members of the Abitibi staff enrolled for the school are engineers with war service, and there is little doubt that they can develop valuable skills at a well-supervised school of this kind in a fraction of the time which would be taken if they had to acquire the necessary industrial *savoir faire* the hard way, through trial and error.

◆

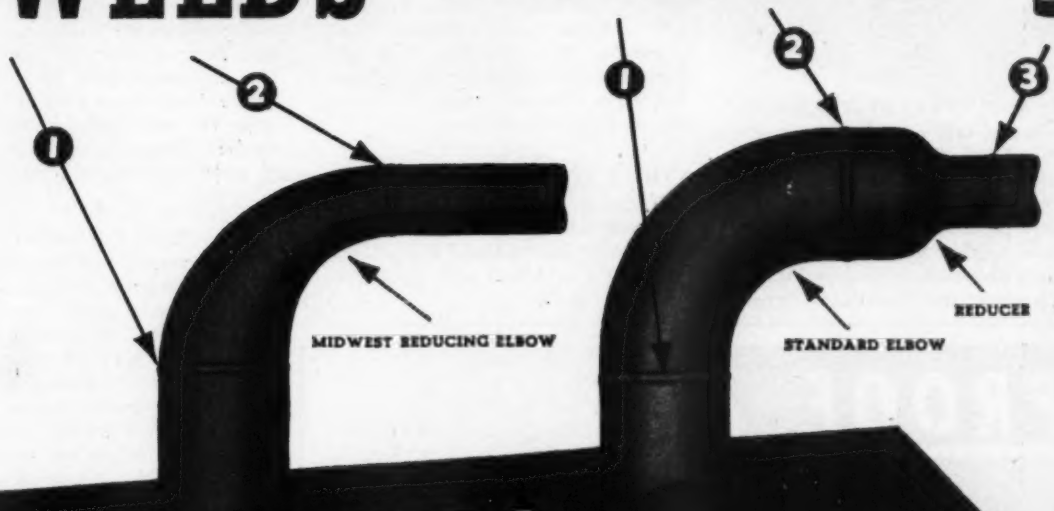
FINAL NEGOTIATIONS MAKE HUMMEL-ROSS A DIVISION OF CONTINENTAL CAN CO.

The assets of Hummel-Ross Fibre Corporation, Hopewell, Virginia, were formally transferred to Continental Can Company on March 20.

This transaction completed an agreement approved at a meeting of Hummel-Ross stockholders on February 4 (Cf. P. I. and P. W., Feb., 1947).

In making the final announcement of negotiations, Hans A. Eggerss, Continental president, stated that the newly acquired mill will be operated as the Hummel-Ross Division of Continental Can Company.

2 WELDS INSTEAD OF 3



AND YOU GET A BETTER PIPING JOB

MIDWEST

REDUCING WELDING ELBOW

- SAVES WELDING
- SAVES MONEY
- SAVES TIME
- REDUCES TURBULENCE
- IMPROVES APPEARANCE

One weld is eliminated when the Midwest Reducing Elbow is used to change both direction and pipe size in a welded pipe line . . . you make only two welds instead of three. This exclusive Midwest Fitting takes the place of both a standard elbow and a reducer, as shown above. This saves time and money, produces a smoother, cleaner, better appearing job. In addition, the gradual reduction, smooth curve and absence of abrupt neck reduce turbulence. Insulation is also easier.

All the advantages of Midwest Standard Elbows are to be found in Midwest Reducing Elbows . . . unusual dimensional accuracy, beneficial effect of working metal in compression, stress relieving, etc. Center-to-end dimensions are the same as for standard elbows with which they are interchangeable.

This reducing elbow is one of many Midwest Welding Fittings designed to reduce the cost and improve the quality of welded piping. Write for Bulletin WF-41 for complete information.

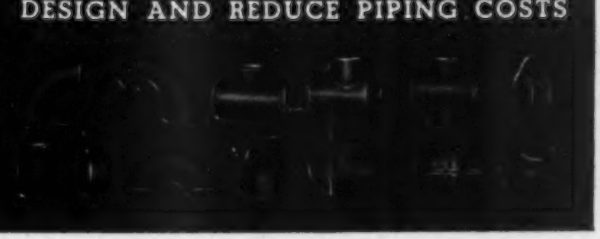
MIDWEST

PIPING & SUPPLY COMPANY, Inc.

Main Office: 1450 South Second St., St. Louis 4, Mo.

Sales Offices: New York 7—30 Church St. • Chicago 3—645 Marquette Bldg. • Los Angeles 33—520 Anderson St. • Houston 2—229 Shell Bldg. • Tulsa 3—533 Mayo Bldg. • Atlanta 3—Red Rock Bldg. • South Boston 27—426 First St. • Distributors in Many Cities.

MIDWEST WELDING FITTINGS IMPROVE DESIGN AND REDUCE PIPING COSTS



BRIEFS

▶▶▶ A PULPWOOD THINNING contest was held on five acres at Columbia, South Carolina, the week of March 10. The purpose of the contest was to stimulate interest in good forestry practices, to teach land owners how to thin forests properly, and to bring about the production of forest products by woodland owners. The contest had been running since October 1 (1946), and was under the sponsorship of the Clemson Extension Service, the South Carolina Commission of Forestry, International Paper Company, West Virginia Pulp and Paper Company, The Champion Paper and Fibre Company, and the Union Bag & Paper Corporation.

◆

▶▶▶ A BRANCH SALES OFFICE will open in Syracuse, N. Y., on April 1 of the International Paper Products Division of International Paper Company. W. A. Scholl will be district sales manager.

▶▶▶ RECLAMATION equipment valued at $60,999 has been purchased by the Heald Division of The Mead Corporation at Lynchburg, Virginia, to dispose of a portion of waste liquors now dumped into the James River. The equipment just purchased will handle about 25 per cent of the waste from the mill; officials stated that most of the waste could be disposed of with equipment costing $180,000.

◆

▶▶▶ A NEW FINISHING building will be constructed by the Byron Weston Company, Dalton, Massachusetts. Contracts already have been let for a two-story structure which will occupy space between the company's Centennial and Defiance mills, and will provide 24,000 square feet of additional space. Novel architectural features will include continuous bands of glass blocks, Quartzite concrete floors, and special air conditioning and lighting.

◆

▶▶▶ A SET OF SIX BOOKS concerning the manufacture of paper and pulp is a recent presentation to the Dalton (Mass.) public library by Crane & Company. The gift was made in memory of Edward O. Reed, late technical director of Crane company.

◆

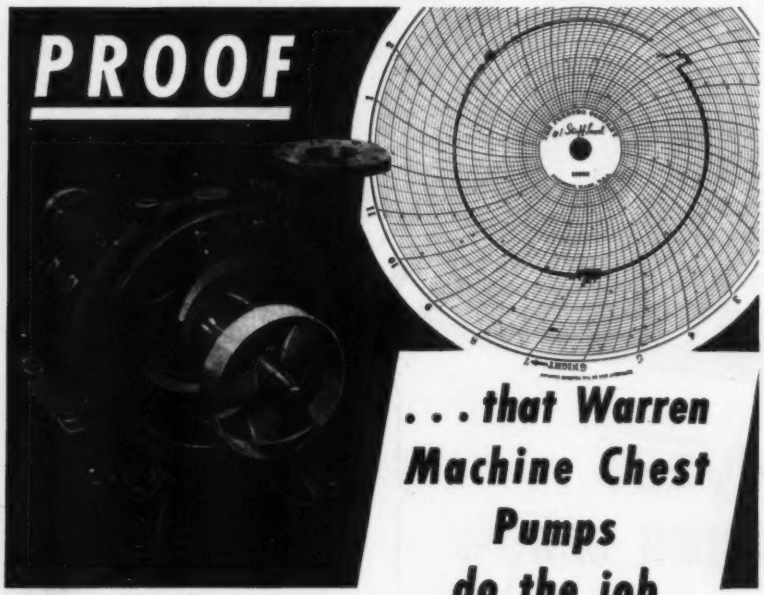
▶▶▶ ON WATSON ISLAND, about eight miles southeast of Prince Rupert, British Columbia, the Celanese Corporation of America will build a plant to produce highly purified cellulose for chemical purposes. Forest land has been reserved to provide a perpetual wood supply.

◆

▶▶▶ THE SINKING OF 3,690 steel shell, concrete-filled piles, late in March, completed the ground work on the $12,000,000 plant of the Southern Paperboard Corporation, Savannah, Georgia. Gair Woodlands Corporation, a subsidiary, has acquired large areas of timberland in North and South Carolina, Georgia, and Florida, to supply pulpwood for the new mill (Cf. P.I. and P.W. April, 1947).

◆

▶▶▶ THE NEW PLANT of the American Can Company in Maywood, Illinois is expected to start May 15 and to be in full swing at an annual rate of 200,000,000 units by August 1. In addition to the entirely new operation at Maywood, installations of fibre milk container-making machinery are also being made at the company's Jersey City, Brooklyn, San Francisco and Los Angeles plants.



THE chart above, made at the plant of a large paper manufacturer, is positive proof of the constant, uniform delivery of Warren Machine and Jordan Chest Centrifugal Pumps. It shows a 24-hour record of stock level in the regulating box... head in chest varied from 0 to 8 feet, yet practically throughout the entire test, the Warren Machine Chest Pump maintained the regulating box level *constant to a fraction of an inch!*

A Warren Centrifugal Chest Pump gives you these advantages over a plunger-type pump: smooth flow without pulsation; discharge valve can be closed and not build up excessive pressure on pump and discharge line; takes up less floor space and much less head room; no pockets to hold old stock; a diagonally split case makes it unnecessary to remove discharge piping—rotating member can be easily lifted out; no noisy gears to create vibration.

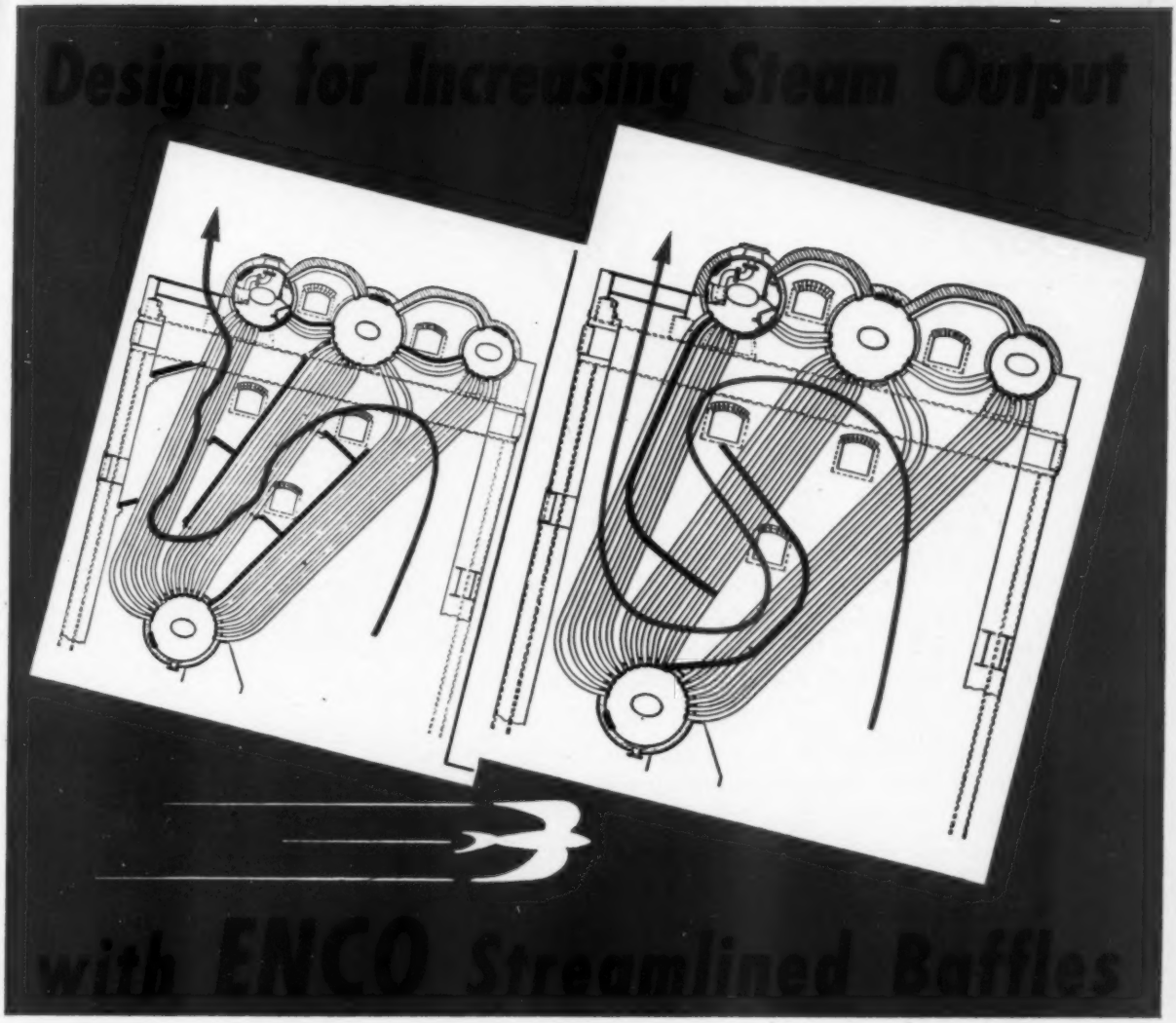
The maintenance charges of a Warren Centrifugal Chest Pump are low as compared with a plunger pump. Renewable liners prevent wear on suction heads—there are no plungers to be turned or replaced. *And in addition, the initial cost of a Warren Centrifugal Chest Pump is lower than that of a plunger pump of much smaller capacity.*

A Warren Centrifugal Machine or Jordan Chest type pump . . . in operation in *your* plant . . . will assure uniform delivery under varying conditions of suction, submergence and density of stock. Write for complete information and list of installations.

Warren Pumps

CENTRIFUGAL *AND* RECIPROCATING PP-43½

Warren Steam Pump Company, Inc., Warren, Massachusetts



These diagrams show how improved baffle design assures a uniform, high velocity gas flow over every square foot of heating surface. How the baffles are smoothly curved to maintain a cross-flow of gases across the tube banks. With ENCO Streamlined Baffles, bottle-necks, dead gas areas, and soot pockets are eliminated; draft-loss is cut to a minimum. The result—more efficient, economical heat transfer.

Power Engineers continue to report that in installation after installation, ENCO Streamlined Baffles are far exceeding their expectations in reducing fuel consumption, furnace maintenance, and increasing steam output.

Especially engineered to suit each individual water-tube boiler, and installed by experienced ENCO crews, ENCO Streamlined Baffles provide for easy tube replacement, low maintenance cost, adaptability to bent tube boilers.

If you want a higher efficiency from your boilers —and a substantial increase in steam output, see your ENCO representative! The 18-page ENCO Bulletin, BW-44, fully describes the profit-proved advantages. Write for your free copy today!

EC-469

THE ENGINEER COMPANY

Also Produces

Enco Oil Burners
Enco Fuel Oil Pumping and Heating Units
Enco Automatic Oil-Electric Ignition System
Enco Automatic Combustion Control

THE ENGINEER COMPANY

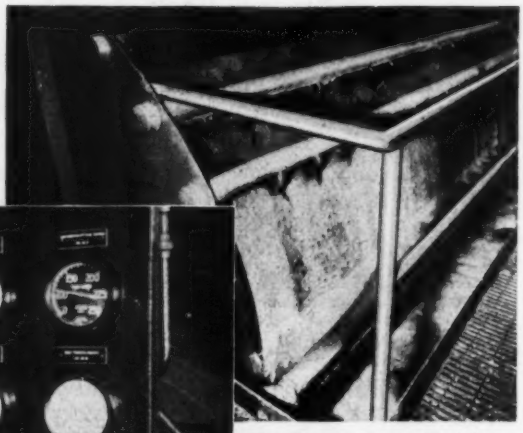
75 West Street, New York 6, N. Y.
Canadian Representative
F. J. Ruskin Ltd., 370 Rachel E., Montreal, P. Q.

Makes Pulp Washing a Science instead of an Art

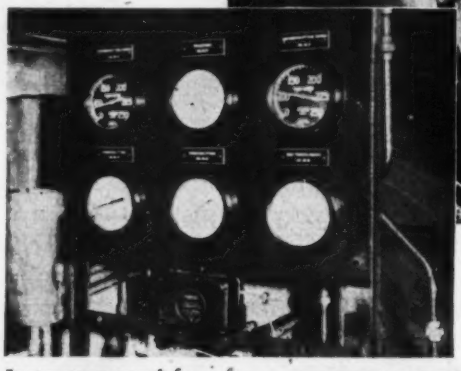
Sheet discharging into repulper from one drum of a 3-drum, 5-stage Swenson-Nyman system.

MILLS no longer need to depend on the judgment of diffuser room operators for successful pulp washing. The Swenson-Nyman Pulp Washer has reduced this process to an exact science under complete instrument control, so that results are uniform and accurate.

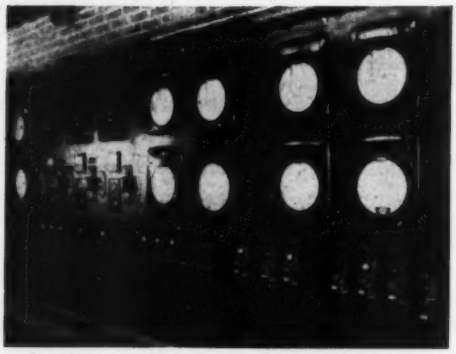
Employing the principle of multi-stage countercurrent washing in a closed system, this equipment is establishing new performance standards for efficiency, flexibility of operation, and low operating cost. It substantially eliminates loss of chemicals to the sewer, reduces dilution and consequent evaporator loads, and delivers a product that is clean, uniform, and evenly washed. Ask to have a Swenson representative give you detailed information and advise how this equipment may be best applied to your operations.



Sheet formation on third drum of the same system. Three shower headers apply wash water.



Instrument panel for one washer drum, indicating vacuum, shower flow, and vat level.



Main instrument panel showing consistency regulator, tank level recorders and controllers, temperature recorders, flowmeter, and motor starters.

SWENSON

SWENSON EVAPORATOR COMPANY

Division of Whiting Corporation
15653 Lathrop Avenue, Harvey, Ill.
Eastern Sales Office and Export Department:
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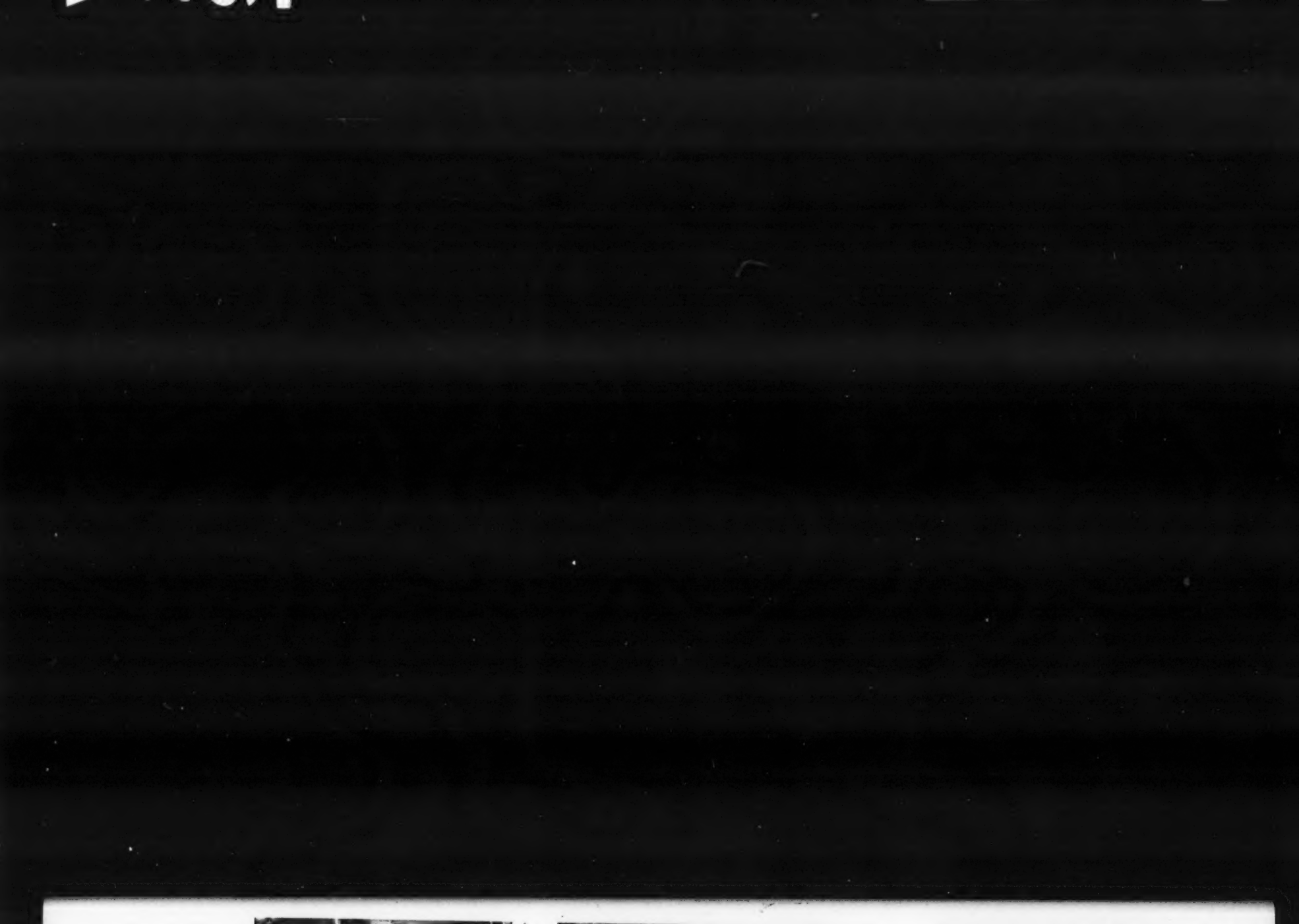
- Black Liquor Evaporators • Causticizers
- Pulp Washers • Lime Sludge Filters • Digester Blow Condensers
- Surface Condensers • Kraft Pulp Deckers



Sutherland

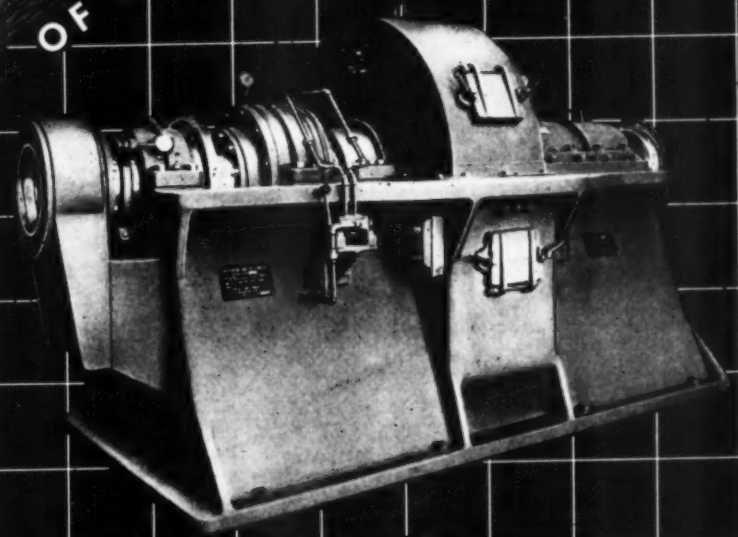
HIGH YIELD

SULPHATE PROCESS

MORE PULP PER POUND OF WOOD

MORE PULP PER POUND

MORE PULP PER POUND



SUTHERLAND *continuous*
BEATING AND REFINING SYSTEM

SUTHERLAND REFINER CORPORATION

TRENTON, NEW JERSEY · *Manufactured in the United States by Valley Iron Works Co., Appleton, Wis.*

SUTHERLAND REFINER LIMITED, 319 DRUMMOND BLDG., MONTREAL P.Q., *Manufactured in Canada by The John Bertram & Sons Co. Ltd., Dundas, Canada*

You Can SEE That

It's ONLY the SIDE of a V-Belt

That Grips the Pulley and Gets the Wear!

Look at a V-Belt in its sheave and you see at once that the *sides* of the belt do all the gripping on the pulley and get all the wear against the sheave-groove wall.

Notice, too—it's the *sides* that pick up all the power delivered by the driver pulley. The sides *transmit* that power to the *belt as a whole*. And then, once more, it's the sides—and the sides *alone*—that grip the driven pulley and *deliver* the power to it.

That is why you have always noticed that the sidewall of the ordinary V-Belt is the part that wears out first.

—and Here Is How the CONCAVE SIDE ★REDUCES Sidewall WEAR and Lengthens Belt Life!

Clearly, since the sidewall is the part that wears out first, anything that prolongs the life of the sidewall will lengthen the life of the belt.

The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the *middle* of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belts can possibly give.

Straight Sided V-Belt

How Straight Sided V-Belt Bulges When Bending Around Its Pulley

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall

Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley

No Bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

★More Important NOW That STRONGER Tension Members are Used

Now that Gates *Specialized* Research has resulted in V-Belts having much stronger tension members—tension members of Rayon Cords and Flexible Steel Cables, among others—the sidewall of the belt is often called upon to transmit to the pulley much heavier loads. Naturally, with heavier loading on the sidewall the life-prolonging Concave Side is more important today than ever before!

THE GATES RUBBER COMPANY Denver, U. S. A.

"World's Largest Maker of V-Belts"

473

GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks **IN ALL INDUSTRIAL CENTERS** of the U. S. and 71 Foreign Countries

Gates

THE MARK OF SPECIALIZED RESEARCH

A. Use the right type valve for the service
B. Place valves correctly in the line
C. Choose Jenkins Valves for lifetime economy

Only Valves with 9 Lives will keep today's Maintenance down

To make sure of extra-long valve life and minimum valve maintenance, follow this simple A-B-C formula.

By choosing Jenkins Valves, you get the accumulated experience of nearly 100 years of valve manufacturing. Countless records prove that Jenkins advanced design, better materials, and better workmanship pays off in lower overall valve costs.

You also get expert counsel of top-notch valve specialists, Jenkins Engineers, whenever you need help on valve selection or placement. *For lowest cost in the long run,* follow this formula . . . choose Jenkins Valves. *Jenkins Bros., 80 White Street, New York 13; Bridgeport; Atlanta; Boston; Philadelphia; Chicago; San Francisco. Jenkins Bros. Ltd., Montreal, Canada.*

SINCE 1864

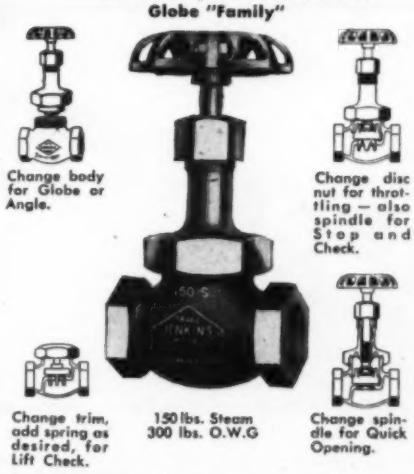
JENKINS VALVES

For every Industrial, Engineering, Marine, Plumbing-Heating Service . . . In Bronze, Iron, Cast Steel and Corrosion-resisting Alloys . . . 125 to 600 lbs. pressure

Sold Through Reliable Industrial Distributors Everywhere

JENKINS FIG. 106-A

Renewable Composition Disc Bronze Globe "Family"


Change body for Globe or Angle.
Change disc nut for throttling — also spindle for Stop and Check.
Change trim, add spring as desired, for Lift Check.
150 lbs. Steam 300 lbs. O.W.G
Change spindle for Quick Opening.

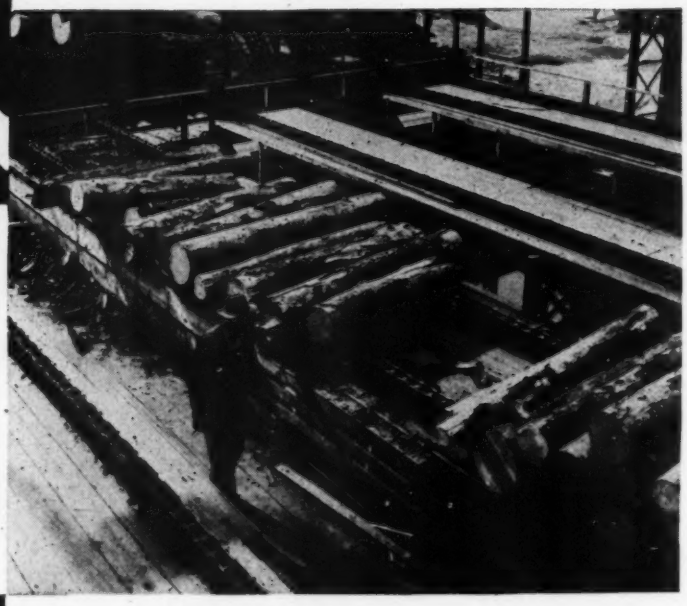
The Fig. 106-A "family" permits valve combinations for 90% of industrial needs through interchangeability of parts. With only four body types and a handful of parts, 18 different types of valves can be assembled. Equipped with the slip-on stay-on disc holder, Fig. 106-A can be restored to good-as-new service in a few minutes.

ONE OF OVER 600 EXTRA VALUE VALVES MADE BY JENKINS VALVE SPECIALISTS

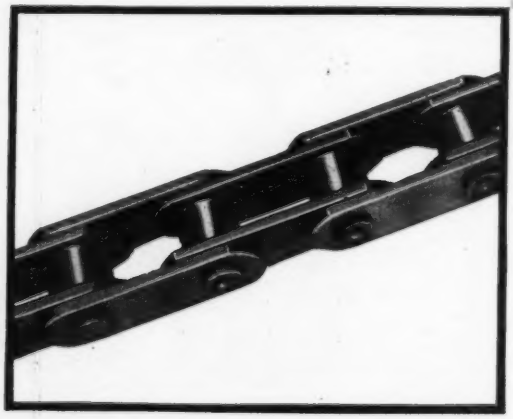
Need a chain with EXTRA strength?

Rex Chabelco

① HERE'S THE CHAIN that's *extra* tough . . . *extra* rugged for mill service. Rex Chabelco Steel Chain is built to stand up under the toughest type of operating conditions to give you years of dependable service.



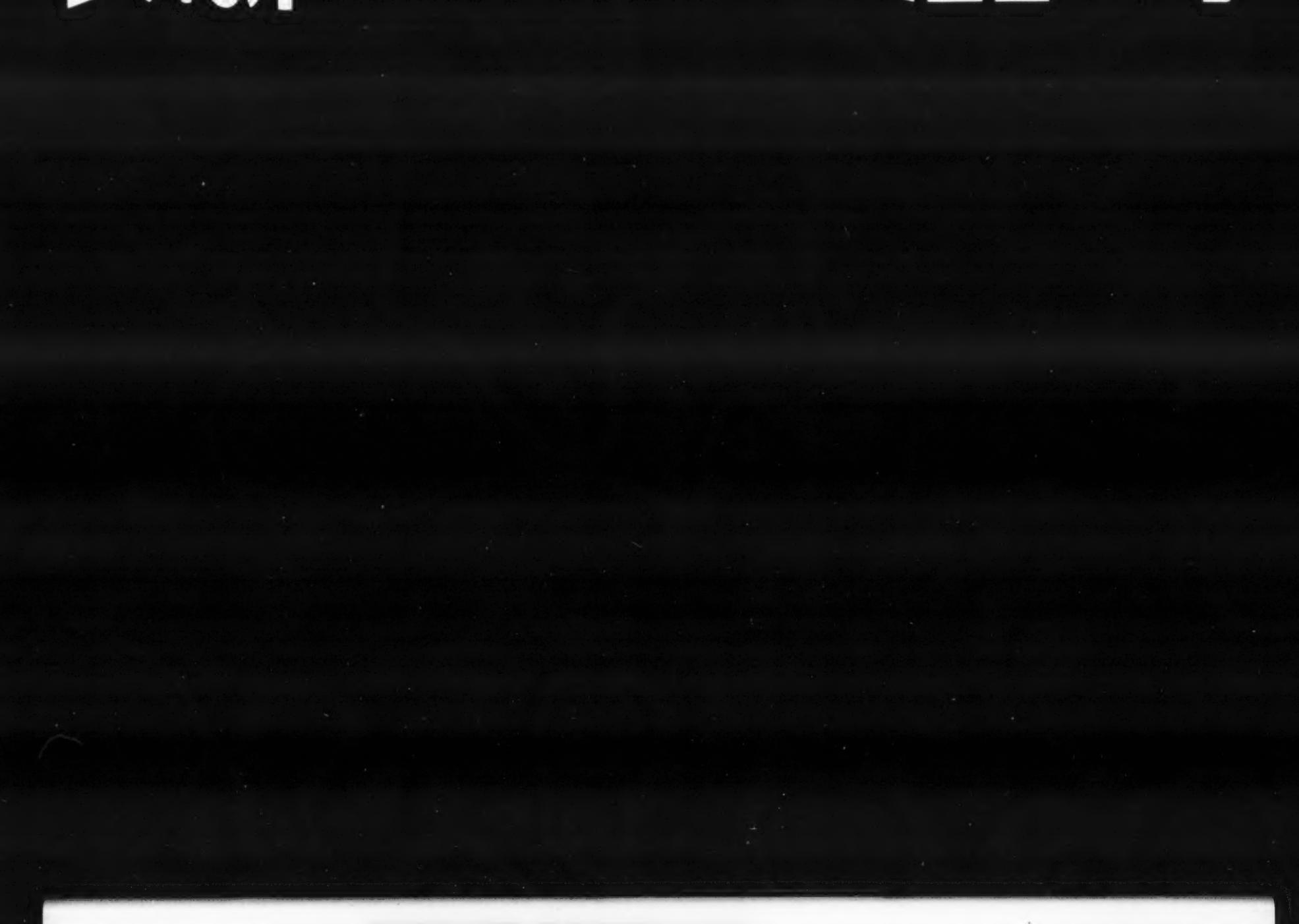
② TAKE THIS MILL, for example. With the application assistance of the Rex Man, rugged Rex Chabelco was installed to feed logs into the mill. It's all in the day's work for Chabelco to have whole sling loads of logs dropped on the chain as shown here. And it will keep right on working through years of economical service. There'll be no production hold-ups here due to premature chain failures.



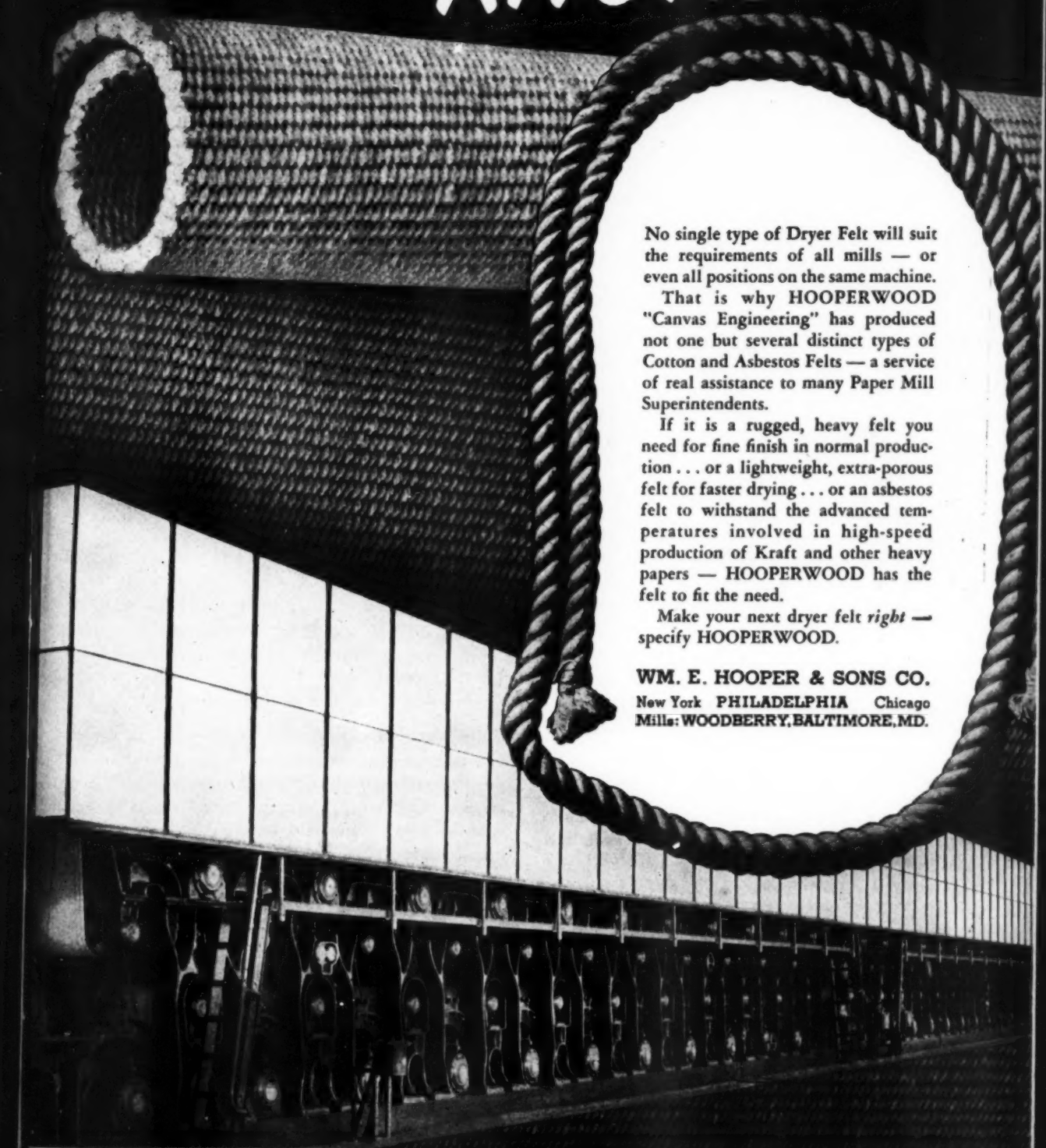
③ AS SHOWN in this close-up, each part of Rex Chabelco is built to exacting specifications. The straight side bar type shown here is the ideal chain for extra heavy-duty conveyor work. Offset side bar types are used for normal heavy-duty conveyors and drives. They maintain accurate pitch, assuring correct alignment of attachments throughout their operating life. The Rex Man will be glad to assist you in the application of Chabelco for your mills. Ask him also about Baldwin-Rex Roller Chain for your high speed drives. Write Chain Belt Company, 1714 West Bruce Street, Milwaukee 4, Wis.

REX CHAIN BELTS

CHAIN BELT COMPANY of Milwaukee



WHAT EVERY PAPER MAKER KNOWS...



No single type of Dryer Felt will suit the requirements of all mills — or even all positions on the same machine.

That is why HOOPERWOOD "Canvas Engineering" has produced not one but several distinct types of Cotton and Asbestos Felts — a service of real assistance to many Paper Mill Superintendents.

If it is a rugged, heavy felt you need for fine finish in normal production . . . or a lightweight, extra-porous felt for faster drying . . . or an asbestos felt to withstand the advanced temperatures involved in high-speed production of Kraft and other heavy papers — HOOPERWOOD has the felt to fit the need.

Make your next dryer felt *right* — specify HOOPERWOOD.

WM. E. HOOPER & SONS CO.

New York **PHILADELPHIA** Chicago

Mills: WOODBERRY, BALTIMORE, MD.

HOOPERWOOD DRYER FELTS

COTTON AND ASBESTOS

A Guilty Felt

ALWAYS LEAVES ITS FINGERPRINTS

The wet felts on a paper or board machine take a terrible beating from the whippers and suction boxes —terrific punishment from the press. This is so obvious that operators naturally suspect felt failure whenever there is a slow down of the machines or imperfection of the finished product.

When our representatives hear complaints of this kind they begin their investigation at the finished sheets. If no felt marks are visible they know that the felts are not guilty. The trouble may be due to faulty alignment, to worn bearings, to distortion of rollers—any one of a hundred details that may easily be corrected.

Quite frequently the difficulty is traced to the use of felts that were not designed for the type of machine or the kind of furnish used. With hundreds of pedigreed Hamilton Felts at their disposal, they are able to provide the most efficient felts for every machine and for the nature of the product to be made on it.

★ ★ ★

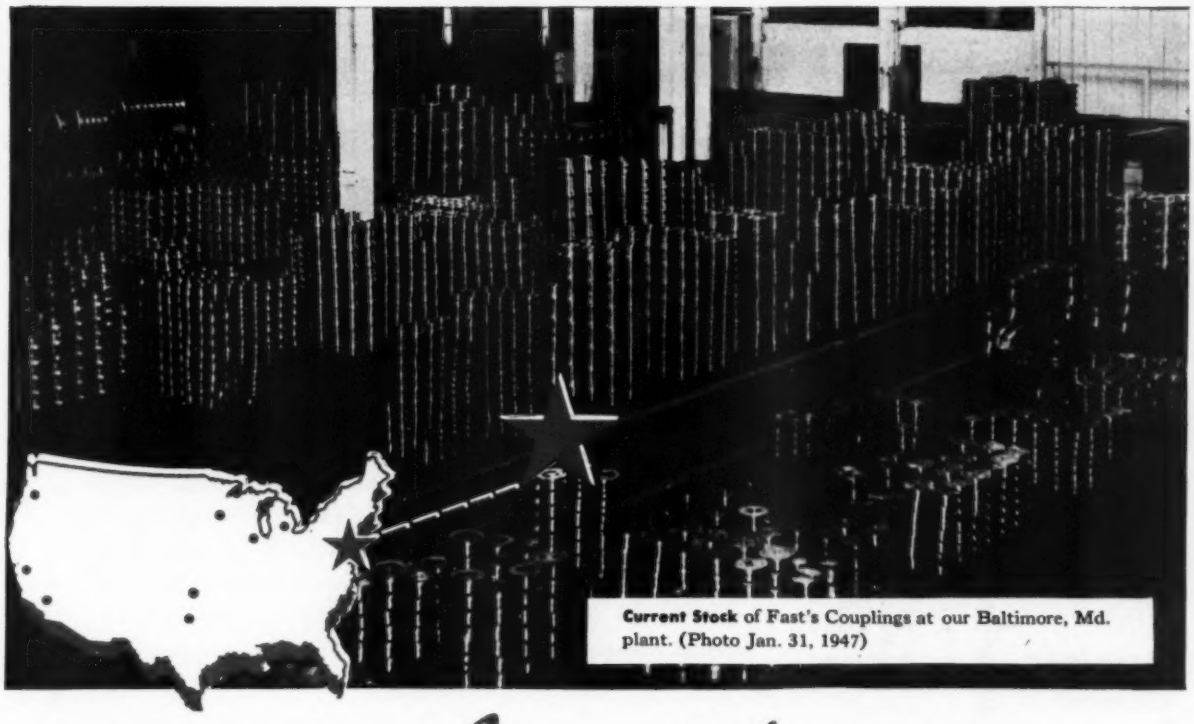
From the thinnest tissue to the heaviest board there is a Hamilton Felt that will do your work better, faster and at lower cost.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

• **Miami Woolen Mills** •

Hamilton *Felts*

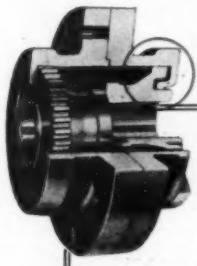
• **Established 1858** •



Current Stock of Fast's Couplings at our Baltimore, Md. plant. (Photo Jan. 31, 1947)

In Emergency, *Immediate* Delivery on FAST'S Couplings

Our usual prompt service on couplings can be stepped up in an emergency. Shutdowns cost money and it is important to remember that Fast's Couplings can be supplied fast—*usually immediately* in an emergency.



We can back up this promise because we maintain a large stock of Fast's Couplings at Baltimore, Maryland, service stocks at Chicago, Illinois . . . Minneapolis, Minnesota . . . Detroit, Michigan . . . and complete stocks at Portland, Oregon . . . San Francisco, California . . . Los Angeles, California . . . Tulsa, Oklahoma . . . and Fort Worth, Texas.

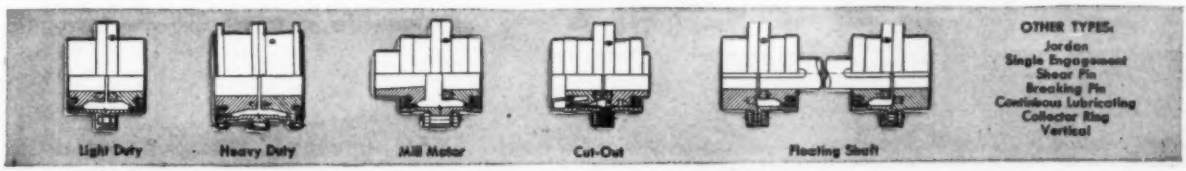
When you specify Fast's Couplings, you can count on them being delivered when you want them. Write . . . wire . . . or phone today to: Koppers Company, Inc., Fast's Coupling Dept., 234 Scott Street, Baltimore 3, Maryland.

Only FAST'S Gives You this Extra Protection

The *exclusive* "rocking bearing," shown in the circle, is one more reason for ordering Fast's Couplings, *now*. It provides a positive metal-to-metal seal to guard the load-carrying oil against moisture, dust and grit. Note that *no* perishable packing rings are used.

KOPPERS

FAST'S *self-aligning* COUPLINGS



...EASTERN HAS A NEW ANSWER!

"Liquid Envelope" gives stainless sheets:

Protection in shipment

Protection in storage

Protection during fabrication

Now you can get Eastern Stainless Steel sheets whose finish won't be marred in shipment . . . in storage . . . in handling . . . or even during fabrication! Eastern is the first in the field with an answer to the costly problem of refinishing. How? Because Eastern is the first to supply stainless sheets protected by "Liquid Envelope", the strippable plastic film, a coating so tough that the sheets can be cold-formed, even deep-drawn *without marring the finish, and with, in fact, improvement in results due to the lubricating property of "Liquid Envelope."*

You can now purchase polished sheets, shape them on the usual brakes or presses, strip the film, and assemble stainless steel equipment with practically no other finishing! This amazing protection cuts costs for both fabricator and user.

Eastern Stainless

Stainless protected by "Liquid Envelope" is the answer to many problems of handling finished sheets. *It proves again that it is wise to . . .*

Specify Eastern Stainless Steel sheets with "Liquid Envelope" today. The plastic coating protects your pocketbook while it guards the stainless finish. And, for down-to-earth information about stainless steel sheets and plates, ask for your copy of the handbook, "Eastern Stainless Steel Sheets."

JM Leo E:Cl

EASTERN STAINLESS STEEL CORPORATION

BALTIMORE 3, MARYLAND

ES

EASTERN STAINLESS

Talk of Recession is Rubbish

▶▶▶ WE ARE AMUSED and sometimes irritated in reading the various articles offered by self-styled analysts of the "Business Outlook for 1947." These carping croakers would have us believe that we are entering an "era of recession" in business. They are constrained to warn the people of America that things are not what they seem to be, for this so-called "recession" is nothing more or less than a collapse of the business structure. To all of which, we reply "rubbish!"

They are wrong—they have been wrong in all their gloomy glomerings ever since V-J Day. Even the best of them have been conspicuously wrong in their analyses and predictions.

For instance, we refer to the Cleveland Trust Company's Business Bulletin, dated December 15, 1945, in which the 1946 Business Outlook was discussed. In addition to the general discussion of the 1946 outlook, it also presented the following forecast:

"National income payments, which have been about one hundred and fifty-six billion dollars in 1945, *will be about one hundred and twenty billion in* 1946, *and will not differ from that amount by more than* 12½ *per cent."*

Well, the national income in 1946 was one hundred and sixty-four billion dollars. Here was an error made by one of the most reliable forecasters in the country of forty-four billion dollars, a difference of 37 per cent instead of 12½ per cent forecasted.

How did it come about that an error of such magnitude was made by one of the outstanding major business prophets? Simply this: They failed to take into account the vast, basic, fundamental, underlying strength of this nation of one hundred and forty millions of the most progressive, most prosperous, most powerful, most cultured, civilized people on earth, enjoying the highest standard of living in the whole world.

The momentum created by the singular devotion to the task of making this nation the arsenal of the world for all armament supplies for itself and all its allies, during five years of intensive "know how" effort, did not slow down after V-J Day. That momentum did not show any slowdown; it never hesitated in its continued forward motion, even when both major and minor prophets of business activity "had a hunch" it would cease. It is as useless to expect a present slowdown of this tremendous momentum as it would be to expect the whirling momentum of this globe on its axis to slow down. It not only will not slow down now, but it will continue for an indefinite period in the future.

Look at the latest national income report of this primary factor in our economy:

"Payments to individuals are still running at record levels. In January, last year, the Department of Commerce estimated these payments as running at an annual rate of one hundred and fifty-seven billion dollars.

"By June, 1946, the rate had jumped to one hundred and sixty-two billion dollars and in December, the figure was one hundred and seventy-five billion dollars. The figures for January, 1947, announced last week March 17th—represented an all-time high peak rate of $176,000,000,000."

The difference between the predicted one hundred and twenty billions by the Cleveland Trust Company and the one hundred and seventy-six billion rate as of January, 1947, is fifty-six billion dollars, which is a sum more than a billion dollars greater than our entire national income for 1935. Our present rate of national income is over three times greater than it was in 1935, only twelve years ago.

The forces which are operating to propel our forward momentum are the domestic and foreign demand for everything we can produce or fabricate. Back of and underneath the fundamental strength of our economy is the amazing growth in our domestic population which is running at an all-time record high.

In the decade of 1930 to 1940, our population increase was 8,894,000. In the decade from 1940 to 1950, we shall add between seventeen to twenty million new consumers or at a rate double that of the previous ten years.

Try and translate this tremendous growth of new consumers into terms of food, clothing, housings and all the living and cultural accessories essential to our modern American standards of life.

"Such an increase means that by 1950, our so-called farm problem will largely cease to exist, that instead of over-production, we will have to increase our factories, our mines, our machines and facilities of every kind."

Try and forecast the immense amount of capital that will be required in the next ten years to take care of the expanding population in this country and provide tools for a high standard of living for our workers. Again, we say that to talk of "recession" in the face of these pressure demand facts is "rubbish."

Adjustments are and have been taking place in various divisions of industry, but with no slowdown or recession in the over-all national strain to produce to the full extent of American capacity. As it looks to us, American production is not going to be able to cope adequately with the over-all consumptive demand. New consumers are being added to the already unsatisfied body of consumption, at the rate of 5,100 a day, on the basis of last year's net birth increase over deaths of 1,860,000 persons.

In terms of paper consumption, 5,100 added consumers per day calls for more than eight hundred tons of increased daily production, or an aggregate of three hundred thousand tons of increased production per year. Here again, the momentum of birth increase has not yet reached its high.

Is it any wonder there is a shortage of paper, steel, automobiles, freight cars, workers, transportation and services?

Consider also the reluctance of capital to increase production installations when the costs of same have doubled in recent years, and the outlook for supplies of raw materials is so uncertain. This country is not yet able to gear up its processes to meet the pressure of demand that is growing greater daily for its products.

In due course of time, the tides of business will resume their natural movements, but before it ebbs again, it must fulfill its flow, which is not in sight as yet.

CURRENT THOUGHT

The Wishful *"If"* .....and a Question of Surveys

WILLIAM SIBLEY

▶▶▶ LAST MONTH the entire nation was shocked by a most regrettable coal mine disaster in southern Illinois. What made it all the more reprehensible was the fact that the physical conditions of the mine were well-known to the Illinois State Bureau of Mines, the safety directors of both operator and union, and to the workers themselves. A petition, signed by some 260 miners in the employ of the Centralia Coal Company was sent to Governor Green protesting the existing working conditions and asking for correction. This was sent nearly fourteen months before the dust explosion wiped out the lives of upwards of 100 miners and wrecked at least fifty homes belonging to those miners.

A week later, John L. Lewis ordered 400,000 miners to stay out of their respective pits for a six-day memorial holiday—"to pay homage to our dead."

If John L. Lewis' lieutenants of the U. M. W. knew of the dangerous conditions in the Centralia mine (and they did), then why in the name of good public relations didn't the bushy-eye-browed John call a strike in that one plant for the plainly expressed and widely publicized demands for safe-working conditions? Let him have warned the operators that unless all safety measures were complied with, he would order his men out of their pits until such compliance had been made—shucks!—such a public demand would have had the unanimous support of both the public and the miners alike . . . And instead of Mr. Lewis shutting down coal production for six days at a time when we are just now beginning to get over his strike of 1946, if he would quietly investigate all other mines, determine where dangerous conditions exist, then threaten strike until those conditions have been corrected—he would regain his former (but now lost) popularity in jig time.

But no—that isn't the sort of thinking that goes through his bushy-haired noggin. What does go through—if anything? Well, don't sell Lewis short on the matter of brains. Thoughts go through his noggin, never forget that.

Last November, Louis Stark, one of the deans of America's labor reporters, wrote in the *New York Times:* "Why is John L. Lewis . . . courting jail and disaster, . . . risking the very life of the powerful miners' union . . . ?" The answer, Stark reasoned, rested in Lewis' ambition to lead America's wage earners in a second round of wage increase demands, to become "uncrowned king of labor," to split the C.I.O. away from Phil Murray and eventually become boss man of a reunited A. F. of L. and C. I. O. With such collective-union power behind him, then he, John L. Lewis (sez I) could logically and powerfully create a third American political party—a Labor Party—and start anew from there! . . . And brethren and sisters—that's all this plagued country needs. A Labor Party, *per se*, would disintegrate the original United States even more rapidly than it did England, who "labored" through MacDonald, back to Balfour and Churchill until it now finds itself in an Attlee-mess.

Far be it from me even to think, much less to advocate, the use of assassination as a cure for dictators. There are many other, and more humane and legal ways to dispose of power-seekers. But when we, as a nation, recognize a seeker-of-power as such—it has long seemed to me that, once recognized, such men might well be removed from the public eye. Here are just a few "ifs" of history.

"If" wild-eyed Bilbo from Louisiana had not been snuffed out by an assassin's bullet—can you imagine what *he* would have stirred up during the depression years, the New Deal spending-years and the subsequent war-years?

"If" the French and the British (who jointly own the property) had closed the Suez Canal to Mussolini at the time he and his Italians were raping Ethiopia—can you imagine what would have been the subsequent events?

"If" after Briand and Umbrella Chamberlain had been defeated by Hitler and Mussolini at Munich—"if"—some brave band of men had gathered together and whisked Mr. Schicklegrubber and his pal, Benito, to, let us say, the Aleutian Islands—can you imagine the amount of misery that would have been saved?

Suppose John L. Lewis was suddenly, and completely and finally, deprived of his "check-off" system of union dues payment. Okay—can you imagine where *he* and his public-welfare-be-damned union would be in twelve months? I am advocating no such thing as violent killing or kidnaping. Just simple, straight, legal action. Then we could brush our hands and say, with finality: "Well—we got *that* dusted off."

◆

▶▶▶ HAVING BEEN FOR YEARS a writer and an advertising man, I have met up with goodness only-knows how many so-called "surveys." Well, since the little advertising magazine, *Tide*, came out with its March 14 issue, I'm through with "surveys." (Or at least all those not conducted by myself.) In that number, *Tide* quotes Sam Gill, research director of Sherman & Marquette, Inc., as having conducted a rather unique (and laughable yet illuminating) "survey" of the "man on the street." They purposely asked a lot of silly, entirely impossible questions—just to see how many of us folks would bluff it through and try to make ourselves feel important and well educated. The results were amazing—more amazing than amusing to us, who must, preforce, depend upon surveys for much of our information. Says, Mr. Gill:

"For example, a group of people were asked 'Which of the following statements most closely coincides with your opinion of the Metallic Metals Act?'

"It would be a good move on the part of the U. S.

"It would be a good thing but should be left to individual states.

"It is all right for foreign countries but should not be required here.

"It is of no value at all.

"Of course, the Metallic Metals Act does not exist. Nevertheless, 70 per cent of those questioned gave investigators an opinion; only 30 per cent had no opinion."

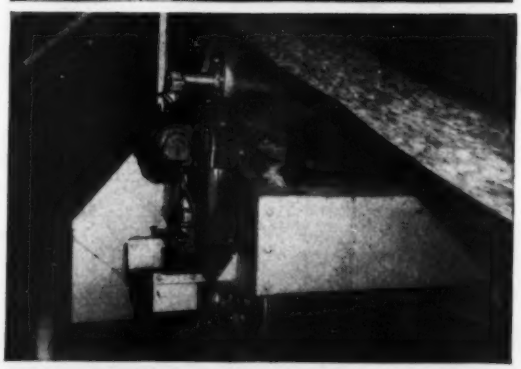
Soo—o-o-o, if that is the sort of audience to whom *I* have been addressing my precious advertising messages and my "gems of American literature" all these years—I'm gonna retire and take up chicken farming in Timbuktu.

LINK-BELT CONVEYORS

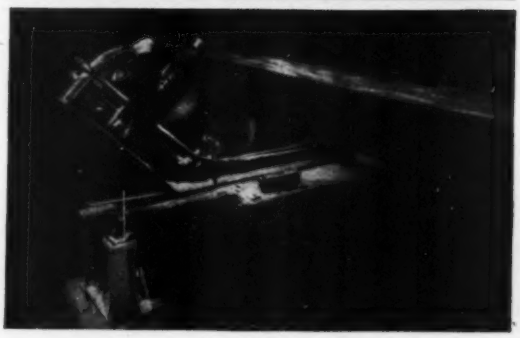
ASSURE EFFICIENT HANDLING AT WEYERHAEUSER

Link-Belt H-124 malleable iron chain conveyors handle the logs to and from hydraulic barker. Link-Belt ➢ FLINT-RIM ➣ sprockets are used on all of these chain conveyors.

A Link-Belt liquid vibrating screen is employed for screening out the fine bark remaining in water discharged from the hydraulic barker.



Link-Belt roller bearing belt conveyors handle chips from whole-log chipper to surge bins over vibrating screens in screen room and from screens to chip storage bins in the mill. Link-Belt ➢ TANK ➣ type trippers are employed for distributing chips throughout surge bin in screen house and the chip storage bin in mill.



Link-Belt Type 100 belt conveyor idlers with 45° end rolls are used. Photo shows Link-Belt self-aligning idler for automatically and positively maintaining long conveyor belt in a central position without injury to its edges.

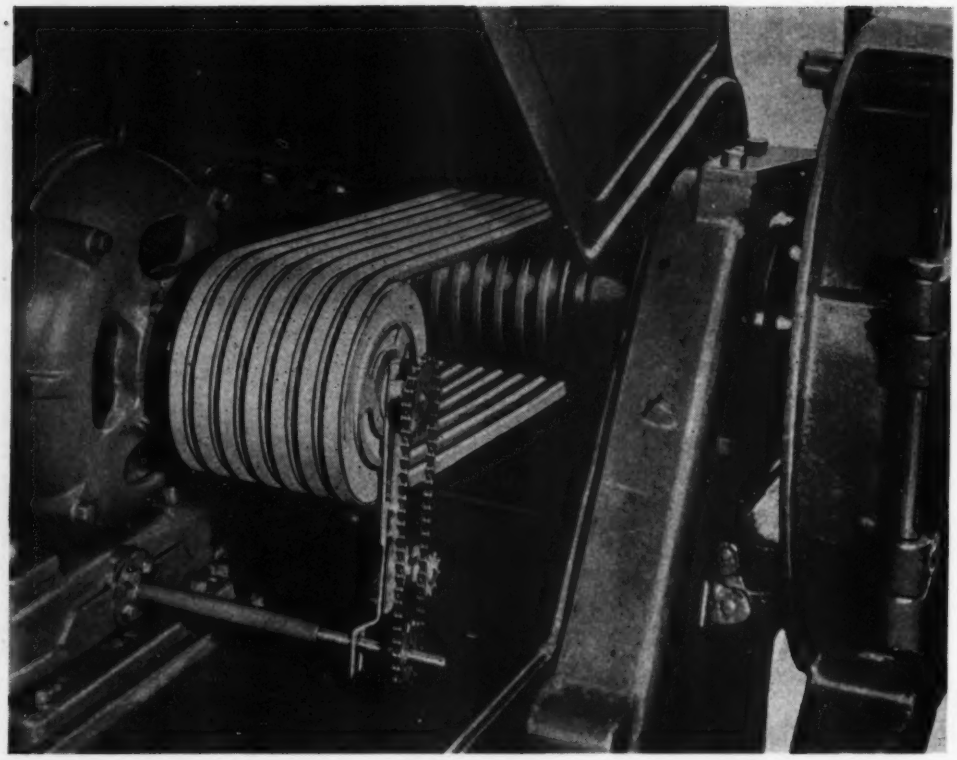
● Link-Belt conveyors handle logs, chips and bark at the modern hydraulic barking and whole-log chipping plant of the Pulp Division of Weyerhaeuser Timber Company, Longview, Washington.

Link-Belt Company manufactures in its own plants, all types of chains, sprockets and a complete line of belt conveyor equipment and accessories, as well as many other types of conveyors, elevators and mechanical power transmission machinery for every service. Link-Belt's "know-how" accumulated through many years of service to the pulp and paper industry the world over, is available to you.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8.
Offices in Principal Cities. 90.8084

LINK-BELT
Chains and Conveyors



Texrope *VARIABLE* Speed Drive ... the practical way to get *Accurate Speed Control*

- To regulate a machine tool to suit variations in job, material, or individual workman
- To control the volume of air from heating and ventilating fans
- To vary the speed of a pump, spinning frame, conveyor, rock crusher or grinding wheel
- *Wherever* the ability to change operating speeds at will can add to efficiency, output or economy—

Install Texrope Variable Speed Drives!

These flexible drives use economical constant speed motors. They provide infinite speed variations within their ranges—quickly, easily, accurately.

Vari-Pitch sheaves using A, B, C, D or E belts are available for stationary or motion control, with range up to 25% per sheave; *Vari-Pitch* sheaves using Q or R wide belts allow variations up to 100%; *Vari-Pitch* speed changers permit ranges up to 375%. There are types and sizes to suit all needs, from fractional to 300 hp!

Texrope offers the *most complete* line of variable speed drives made ... engineered and built by Allis-Chalmers, originator of the multiple V-belt drive. See Sweet's Catalog, or call your nearby A-C office or dealer for Bulletin 20B6051G. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

A 2200

TEXROPE .. Greatest Name in V-Belt Drives

"Super 7" V-BELTS
Five Types — Sizes to suit every power transmission job.

Texsteel, Texdrive, "Magic-Grip"
— sheaves in a full range of sizes, grooves.

"Vari-Pitch" SHEAVES
Exact variations in speed, stationery or motion control.

SPEED CHANGERS
Speed variations up to 375% at the turn of a crank.

ENGINEERING
Finest V-Belt engineering talent in the world—at your call.

TEXROPE "Super 7" V-Belts result from the cooperative research of two great companies — Allis-Chalmers and B. F. Goodrich. They are sold only by A-C.

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

1847 1947 A CENTURY OF SERVICE to Industry THAT MADE America Great

RESIST

CORROSION · ABRASION · HEAT

in the Paper Mill

with COOPER STAINLESS STEEL · · ·

CASTINGS

FITTINGS

CENTRIFUGAL PIPE

COOPER'S 25 Years of close association with the Paper Industry and its intimate knowledge of the problems peculiar to that industry . . . plus vast technical experience combined with practical shop skill has resulted in COOPER'S unusual ability to produce sound corrosion resisting Stainless Steel castings, fittings and centrifugal pipe specifically designed to resist corrosion, abrasion and heat in the Paper Mill.

Each step in the production of COOPER Stainless Steel products is fully controlled . . . for all facilities and services at COOPER are located under one roof making The Cooper Alloy Foundry Co. the largest of its kind in the country.

THE COOPER ALLOY FOUNDRY CO.

HILLSIDE, NEW JERSEY

UNION PACIFIC

TREASURE MAP OF INDUSTRY

Oregon*

EXTENSIVE FOREIGN TRADE

FINE TRANSPORTATION

ECONOMICAL POWER

GREAT SALMON FISHERIES

AGRICULTURAL WEALTH

WORLD FAMOUS WOOLEN GOODS

ROOM TO EXPAND

LEADER IN LUMBER PRODUCTION

SCENIC BEAUTY

* *One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.*

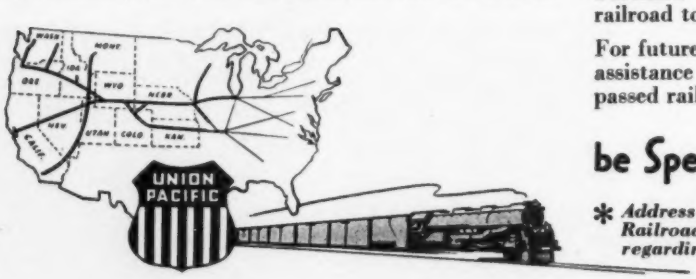
When the Beaver State presents its business card, it could justifiably read, "Enterprise, Unlimited." Industry re-discovered Oregon during the war. It found boundless opportunities capable of providing a livelihood for 10 times the state's present population.

Topographical, soil and climatic features make possible a variety of agricultural pursuits. The fabulous Willamette Valley—some three million acres—is a cornucopia of agricultural wealth. A tremendous quantity of lumber is available. The state has one-fourth of the country's standing saw timber. Salmon fisheries and woolen goods are world-famous. Portland's roomy harbor is a flourishing gateway of foreign commerce.

Huge Bonneville Dam assures ample and economical power. A new development program calls for four more dams. Oregon is noted for low electric rates.

Union Pacific provides Oregon with excellent freight and passenger transportation. Gigantic locomotives haul the state's products eastward over the "strategic middle route." And—just recently—Union Pacific inaugurated daily Streamliner service on the "City of Portland" between Portland and Chicago; the first railroad to provide such service.

For future industrial enterprise, remember Oregon. For assistance in selecting industrial sites and for unsurpassed rail transportation, just . . .



be Specific – say "Union Pacific"

* *Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska, for information regarding industrial sites.*

UNION PACIFIC RAILROAD

THE STRATEGIC MIDDLE ROUTE

Conveniently-packaged labor-saving V★S Drives are available from 1 to 200 hp.

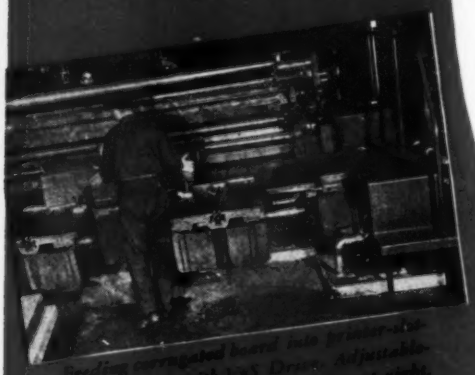
PRODUCTION COSTS DOWN with RELIANCE V★S DRIVE

The *All-electric, Adjustable-speed Drive operating from A-c. Circuits,* V★S provides quick, smooth starts and stops —an infinite range of truly stepless speed changes—continuous maintenance of proper tension. Control can be automatic or manual . . . right at the machine or from nearby or remote stations. If you have not yet discovered the variable-voltage way to increased production and lower costs, write today for Bulletin 311—or call your nearest Reliance representative.

RELIANCE ELECTRIC & ENGINEERING CO.

1078 Ivanhoe Road • Cleveland 10, Ohio

Appleton, Wis. • Birmingham • Boston • Buffalo • Chicago
Cincinnati • Denver • Detroit • Gary • Grand Rapids
Greenville, S. C. • Houston • Kansas City • Knoxville
Los Angeles • Milwaukee • Minneapolis • New Orleans
New York • Philadelphia • Pittsburgh • Portland, Ore.
Roanoke, Va. • Rockford • St. Louis • San Francisco
Seattle • Syracuse • Tampa • Tulsa • Washington, D. C.
Sao Paulo, Brazil



Feeding corrugated board into printer-slotter equipped with V★S Drive. Adjustable-speed motor is built into machine at right.

RELIANCE V★S DRIVE

Operator at delivery end adjusts machine operation through V★S All-electric push-button control.

Stacks of slotted and printed board are counted out with V★S Drive on the job.

RELIANCE A-C D-C MOTORS

"Motor-Drive is More Than Power"

.....Old Chief Sharp-Eye

A wily redskin, he laid his ear to the ground to detect the pounding hoofs of enemy forces. On the trail he saw all, knew all.

Many a paleface is a veritable "Sharp-Eye" about his plant, able to locate a hot bearing by the finger's touch, able to spot any unusual rattle, or squeal, or excessive wear of a part.

To be on the alert forestalls costly shutdowns. That's why screen plates, jordans, refiners, press rolls, drives and everything else subject to wear should be eternally watched.

When ordering replacements, be specific to avoid delays.

SHARTLE BROTHERS

MIDDLETOWN, OHIO

SHARTLE Dilts

DILTS MACHINE WORKS, FULTON, NEW YORK
Divisions of The Black-Clawson Co., Hamilton, Ohio
Associate: ALEXANDER FLECK LIMITED, OTTAWA, CANADA

easy . . . when you know how

• The paper industry has learned by experience that the production of high-grade coated paper calls for Calcium Carbonate. And Wyandotte Chemicals Corporation has learned by experience how to produce a Precipitated Calcium Carbonate that is unequaled in brightness and freedom from grit and abrasiveness . . . in hiding power and ink absorption . . . in that uniformity which is essential to coating.

• For many years Wyandotte has made a *business* of producing Calcium Carbonate—acquiring a great fund of technical knowledge and a high degree of expertness. *You* benefit by this experience . . . you have at your service a Calcium Carbonate that will meet your most exacting requirements.

• Technical bulletins on Wyandotte Precipitated Calcium Carbonate are available upon request.

WYANDOTTE CHEMICALS CORPORATION
WYANDOTTE, MICHIGAN • OFFICES IN PRINCIPAL CITIES

Soda Ash • Caustic Soda • Bicarbonate of Soda • Calcium Carbonate • Calcium Chloride • Chlorine
Hydrogen • Sodium Zincates • Aromatic Intermediates • Dry Ice • Other Organic and Inorganic Chemicals

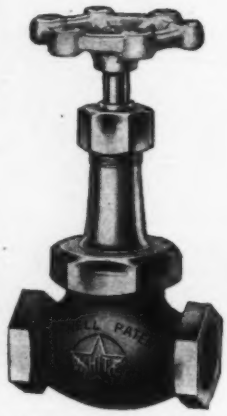
Wyandotte
REG. U. S. PAT. OFF.

For assured flow control, the valve must suit the service

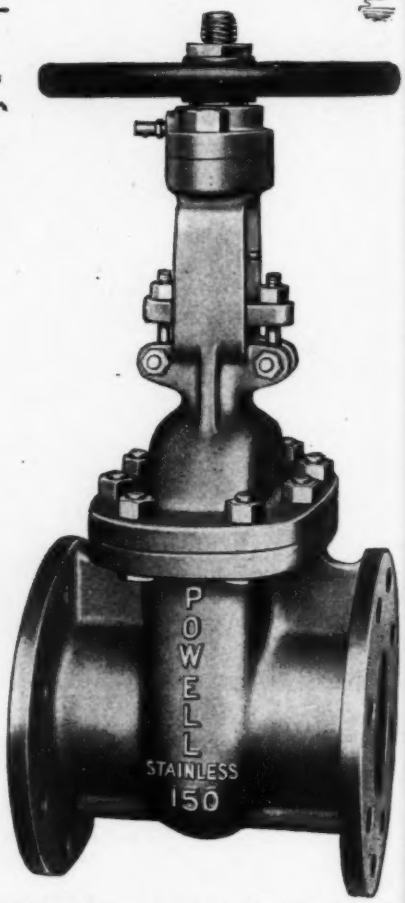
You don't have to be an Isaac Walton to know what's wrong with these fishing pictures. Silly misapplications of equipment, aren't they? But no sillier than using *valves* in services for which they were not specifically designed.

Through more than a hundred years of making valves—and valves only—Powell Engineers have been designing the *right* valves to suit the specific requirements of every existing industrial flow control service. Today, the Powell Line includes Bronze, Iron and Steel Valves of every necessary type, design, size and pressure. And, for corrosion resistance, Powell makes a notably complete line in the widest range of pure metals and special alloys ever used in making valves.

That's why, *for assured performance,* it pays to consult Powell.



Small size 200-pound Bronze Globe Valve for steam, oil, water or gas. For assured, long-life performance it has a renewable, specially heat treated stainless steel seat and a regrindable, renewable, wear-resisting "Powellium" nickel-bronze disc.



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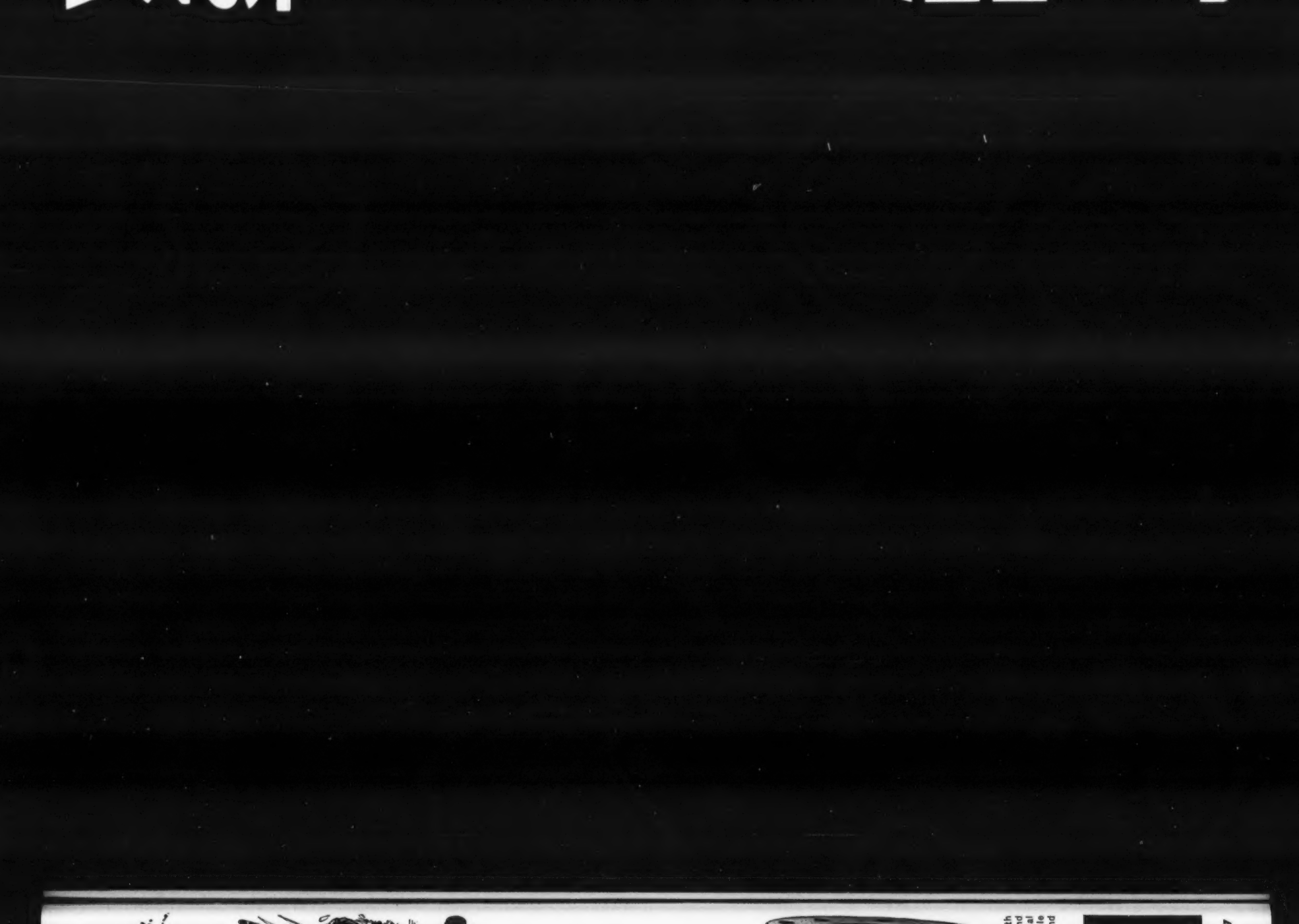

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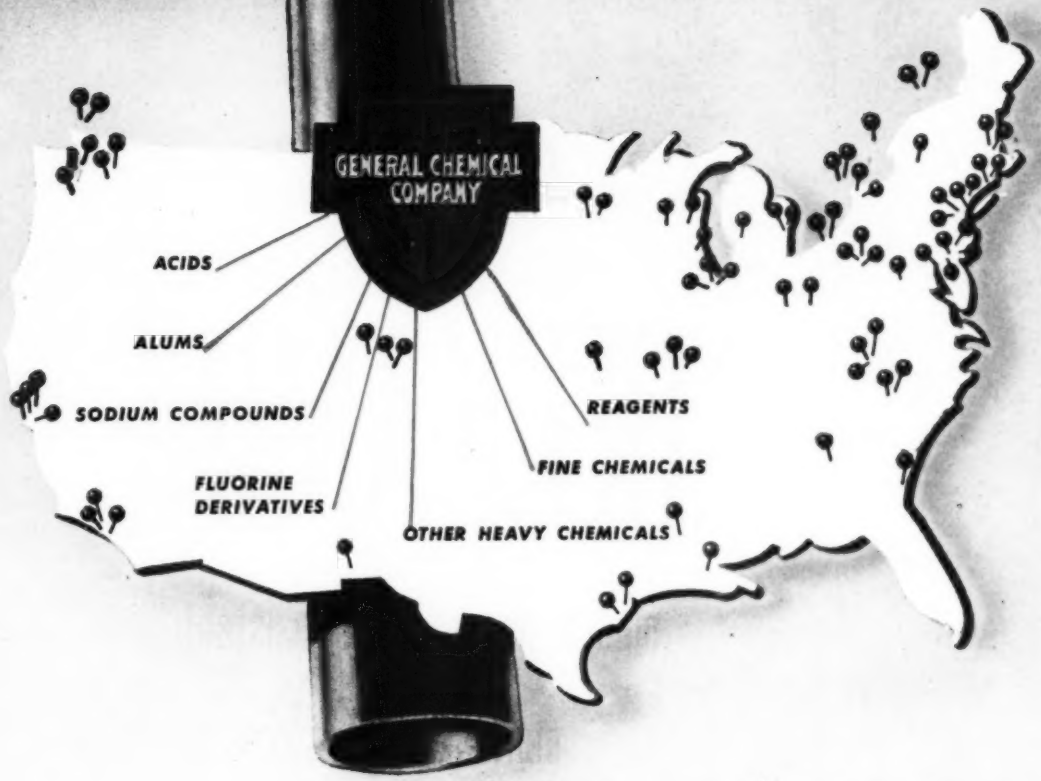

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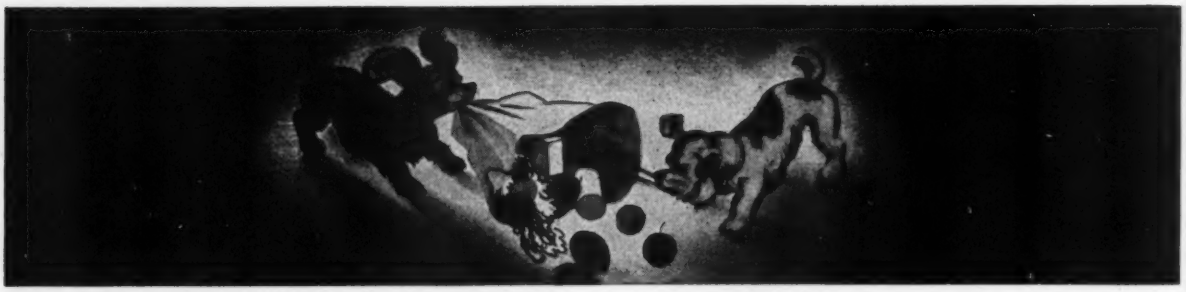

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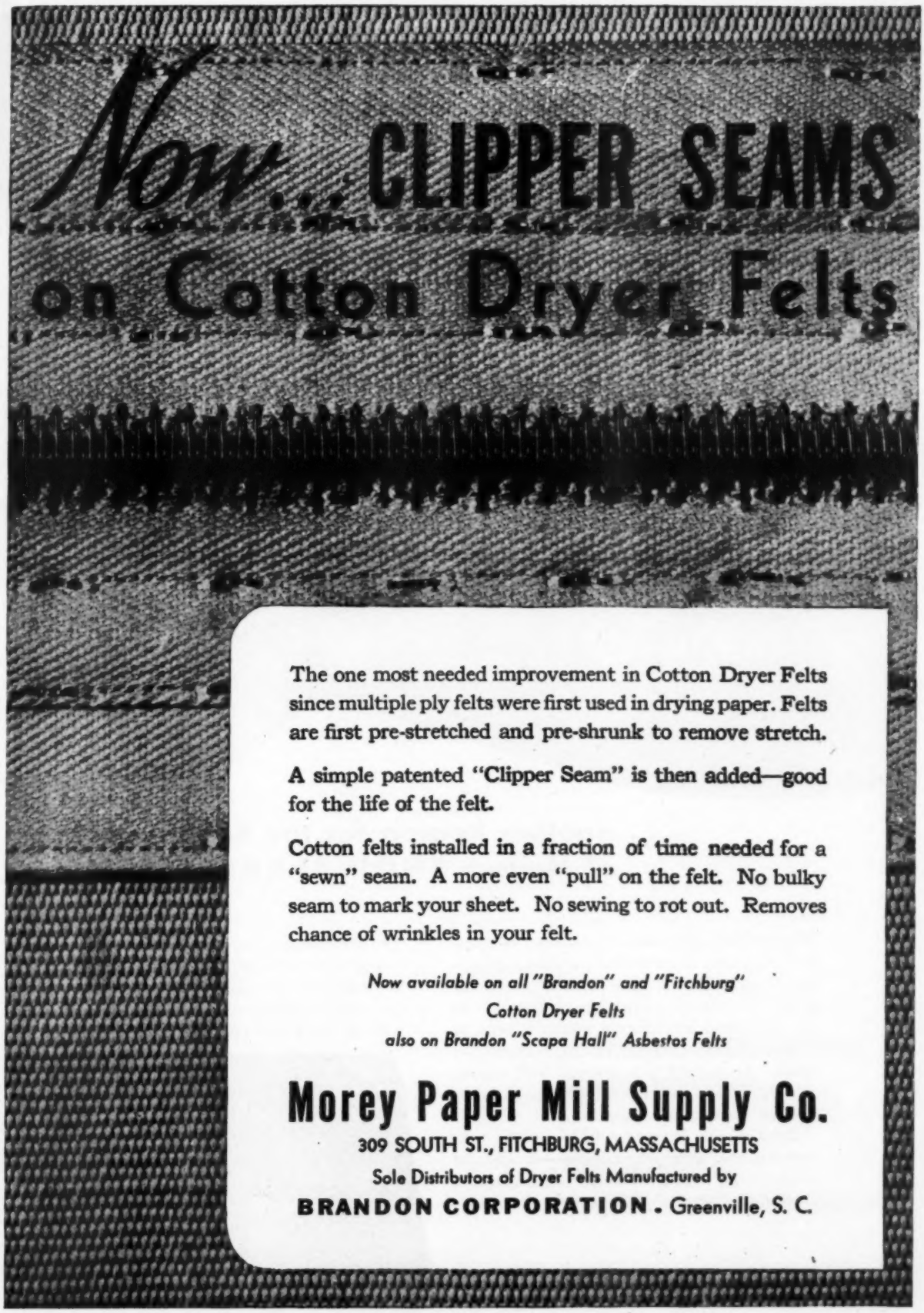

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THE PAPER INDUSTRY
and PAPER WORLD
April, 1947

Trends in Timber Supply of the Carolinas

RONALD B. CRAIG[1]
and
J. W. CRUISHANK[2]

▶▶▶ THE STATES OF North and South Carolina are among the leading pulpwood producing states of the southeast. In 1945, fifteen pulp companies obtained more than 1.5 million cords from these two areas, and the seven local mills procured more than 1.6 million cords from these and neighboring states. Furthermore, over one-fourth of the pine timber cut annually from the forests of South Carolina, and nearly ten per cent of that cut from North Carolina, go to the pulp mills. The pulp industry, therefore, is vitally concerned with the forest resources of these two states and the trend in growing stock volumes, both pine and hardwood.

Data used in this presentation consist of the original inventory of timber resources made by the Forest Service about ten years ago, annual surveys of industrial and domestic wood use, and annual computations of timber growth. These provide a means of estimating the change in timber supply for, roughly, the past decade.

The Forest Resource

More than one-half the land area of these two states is forested—a total of 29 million acres. Less than ten per cent of the timberland is in public ownership, chiefly national forest. The bulk of the land is in farm ownership, 15.8 million acres, but pulp company holdings are in excess of one million acres and are expanding rapidly. Lumber companies, other forest industries, and a variety of small nonfarm owners control the rest.

Ownership is mentioned here because it has such an important bearing upon utilization and management of the timber resource. For instance, a recent survey by the Forest Service indicates that 76 per cent of the operating acreage of pulp companies in the Carolinas and Virginia is being cut under practices that rate good or better. In contrast, 74 per cent of the cutting on farm woodlands is poor or outright destructive. The problem is to get proper management and utilization know-how into the hands of some 250,000 farm woodland owners and several thousand other nonfarm owners. Until this is done there will not be any marked improvement in the quantity or quality of timber on the lands which comprise 55 per cent of the forest area of the Carolinas. The forest industries can be of very material help through an intensive educational program and by following good cutting practices on noncompany lands. From a practical standpoint, it is to their interest to render such help in view of the increased competition for wood as consumption increases and timber supplies decline.

In both states, the loblolly and shortleaf pine types occupy about one-half the forest area. North Carolina also has nearly two million acres in pond pine, but there is almost none in South Carolina. Bottomland hardwoods, chiefly tupelos and sweetgum, occupy 4.8 million acres. Expressed on a percentage basis of the more desirable types (loblolly, shortleaf, and long leaf pine, and bottomland hardwoods), South Carolina has 93 per cent of its area in these types, North Carolina has only 62 per cent.

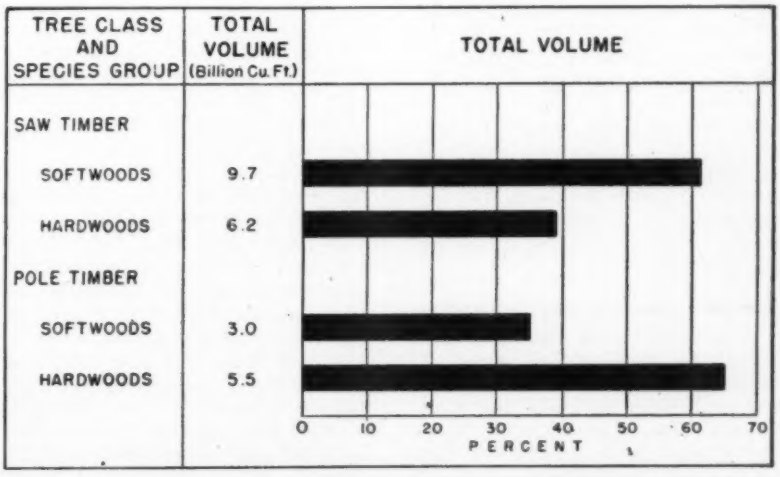

Fig. 1—Cubic foot volume by tree-class and species group

(1) Forest economist, and (2) chief, Division of Forest Economics, Southeastern Forest Experiment Station, U. S. Forest Service, Asheville, N. C.

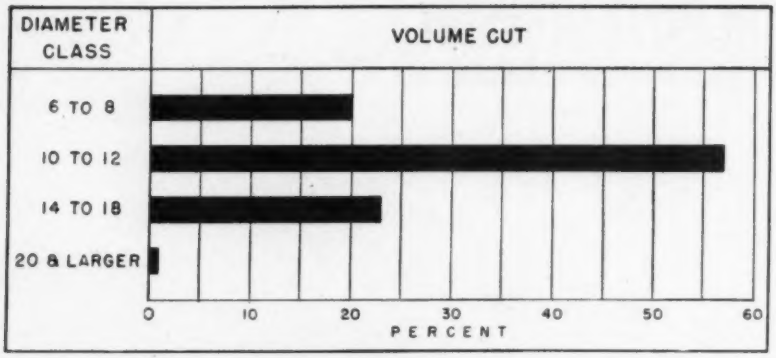

Fig. 2—Pulpwood cut by tree diameter class in South Carolina

No such differences between states exist, however, in the distribution of area by stand class. For the two states, a little more than half the area is in saw timber, 15.7 million acres. Fourteen per cent is in pole timber, 21 per cent in saplings, and 10 per cent is in poorly stocked reproduction. This poorly stocked area of nearly 3 million acres is only in the reproduction and sapling class, and does not include the poorly stocked areas of pole and saw timber.

Two-thirds of the 71.8 billion board feet of saw timber in the two states is softwood. Loblolly pine, with 27 billion feet, makes up 37 per cent of the total of all species in each state. Shortleaf pine ranks next with over 9 billion feet. Two billion of the 11.4 billion feet in "other softwoods" in the region is cypress. Oaks, sweetgums, and tupelos make up about equal proportions of the total volume.

The total volume of all sound trees 5 inches d.b.h. and larger is 24.4 billion cubic feet, of which only a little more than one-half is softwood. The saw-timber equivalent of the cubic-foot volume is 15.9 billion cubic feet, while pole timber amounts to 8.5 billion. It is significant that 61 per cent of the saw-timber volume is softwood, while only 35 per cent of the pole-timber volume is softwood (Figure 1). This pole timber and the saplings below cordwood size (which are also predominantly hardwood) constitute tomorrow's saw timber. If present utilization trends continue, that saw timber will have about the same proportion of hardwoods that it now has of softwoods.

Forest Industries and Utilization

The forest industry of this region is well diversified, both in variety of products and in location of plants. North Carolina has more than 3,400 primary plants, South Carolina about 1,350, manufacturing some 15 types of products. Sawmills account for all but 260 of the 4,758 plants. There are seven pulp mills in the two states, four in North Carolina. Four of the seven are sulphate mills; two are plants using defibrated wood, and one uses both sulphate and soda processes. Two of the sulphate mills—International Paper Co. at Georgetown, S. C., and West Virginia Pulp and Paper Co. at Charleston, S. C.—are among the largest pulp mills in the nation. Veneer plants total 102, shingle mills 34, all other industries 117.

Commodity drain is defined as the volume of wood utilized for each product plus the usable material left in the woods. Lumber accounts for the largest proportion of drain. Although softwood drain for lumber has decreased in per cent of total drain in both states over this period, hardwood drain for lumber has shown a slight increase. The proportion of pulpwood drain from softwoods has increased sharply in both states, tripling in North Carolina and doubling in South Carolina. These percentages, of course, do not show the increase or decrease in absolute volume of drain, but merely the change in proportion of total drain used for each product.

Lumber drain in North Carolina for the period 1937-1945 averaged 1.5 billion board feet per year, ranging from a low of 1.2 billion feet in 1939 to a high of 1.7 billion feet in 1942. In South Carolina it averaged 858 million board feet per year, ranging from 624 million feet in 1938 to 1.1 billion feet in 1941. Production has been considerably more erratic in North Carolina than in the other state.

In pulpwood, South Carolina takes a considerable lead over North Carolina. Her pulpwood production increased rapidly from 394,000 cords in 1937 to nearly one million cords in 1943 and 1944, dropping slightly in 1945. North Carolina started with 240,000 cords in 1937, reaching peak production at 606,000 cords in 1942, then declining to 472,000 cords in 1945, in which year pulpwood constituted 9 per cent of the softwood and 2 per cent of the hardwood drain. One factor in pulpwood drain in South Carolina is its concentration. One-fourth of the 1945 production of 877,000 cords came from three adjoining counties—Fairfield, Newberry, and Kershaw. Another 28 per cent of this state's production came from the five coastal counties near the two large pulp mills at Georgetown and Charleston. In 1945, more than one-fourth of all softwood cut in South Carolina, and four per cent of all hardwood, went into pulpwood.

One question which is usually brought up in discussing pulpwood is its competition with saw timber. In South Carolina, 80 per cent of the pine pulpwood comes from trees of sawlog size, and one-fourth of it from trees 14 inches d.b.h or larger (Figure 2). There can be no question, therefore, of the keen competition for sawlog-size trees in that state between the pulp and lumber industries. In some cases, mutually agreeable relations between these competitors are being worked out, particularly in the coastal counties where quality saw timber from pulp company lands is sold to lumber mills or pole and pile dealers, and trees not suitable for lumber or other products on sawmill lands are sold to pulp companies. Nevertheless, too much quality pine saw timber is still going into pulpwood if the growing stock of such timber is to be maintained. At the same time, small sawmills cut much small timber that more properly should be used for pulpwood.

Total drain for all products in the two states follows nearly parallel trends. For the period 1937-1945, the average annual drain in North Carolina has been 8.4 million cords, and in South Carolina 4.9 million cords, a regional total of 13.3 million cords. Since 1942, the trend has been steadily downward in both states, North Carolina's drain declining by 19 per cent and South Carolina's by 20 per cent. It is not likely that this decline will continue, however, in view of proposed pulp and paper mill expansion and continued high demand for all forest products. For instance, 1946 receipts of pulpwood in the southeast were about 19 per cent above 1945, and 1946 lumber production in the Carolinas may exceed 1945 by 35 per cent.

So much for drain and trends over the period. As an introduction to the balance of growth and drain, an understanding is necessary of the relationship of species-groups in the growing stock to the drain of the Carolinas (Figure 3). In saw timber, softwoods comprise 61 per cent of the growing

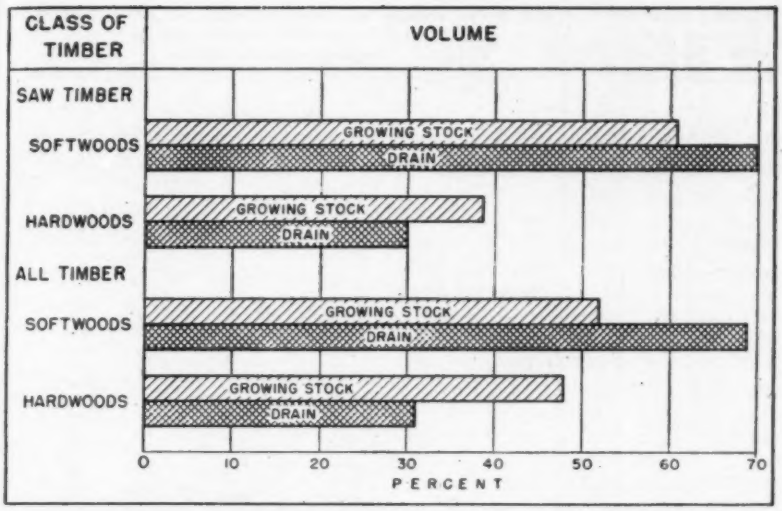

Fig. 3—Distribution of species groups in the growing stock and in the drain, 1945

stock, but they make up 70 per cent of the drain. In other words, we are gradually depleting our softwood saw timber, while building up our hardwoods, which comprise 39 per cent of the growing stock but support only 30 per cent of the drain.

In all timber 5 inches and larger at breast height, softwoods comprise only 52 per cent of the growing stock but provide 69 per cent of the drain, whereas hardwoods, making up 48 per cent of the stand, furnish only 31 per cent of the drain. Not only is the softwood saw timber being depleted, but all softwood timber from saplings on up, thereby slowly converting the pine stands into pine hardwood or pure hardwood. At present 69 per cent of the wood used in the two states is softwood but if present trends in species utilization continue over the next two or three decades, some readjustment in the forest industrial economy of the Carolinas will be necessary.

Trend in Timber Supply, 1937-1946

To obtain a better picture of the change in the timber supply over the past nine years, differences are presented for saw timber and for all timber above five inches in diameter, by states and parts of states, and by species-groups.

Saw Timber: In North Carolina the softwood saw timber increased slightly until 1940, then began a gradual decrease as the full force of war demands began to take effect. By 1946 there was 1.7 per cent less volume than in 1937, a decrease of about 493 million board feet. In South Carolina the same general trend occurred but the pine saw-timber volume did not fall below the 1937 level until 1943. By 1946 there was 2.4 per cent less softwood, a loss of about 470 million board feet.

The situation is different with respect to hardwood saw timber. In North Carolina it increased slightly because drain exceeded growth only in 1941 and 1943 and then by small amounts. By 1946 there was 1.6 per cent, or 223 million board feet more saw timber than in 1937. South Carolina did not share in the increase, however. Because of the large excess of drain over growth in each year 1940 through 1943 there was one per cent, or 99 million board feet, less saw timber than in 1937.

The change in the saw-timber growing stock, for both states, are summarized below:

	Million Bd. ft.
Pine saw timber	−963
Hardwood saw timber	+124
All saw timber	−839

All Timber: The pulpwood industry is interested in the changes in the supply of all timber, both saw timber and smaller trees. In general, this has followed the same trend as saw timber alone. In North Carolina, the softwood growing stock (both saw timber and smaller trees) decreased 983,000 cords and in South Carolina about 1,750,000 cords. This is a 2 per cent decrease in the total softwood volume of the two states.

Because of the very limited demand for small hardwoods for pulp and other forest products the total hardwood volume has increased at a rapid rate. By 1946 there was 11 per cent, or 9.5 million cords, more hardwood timber in North Carolina than in 1937. South Carolina experienced a similar development with a 7 per cent increase, equal to 3.5 million cords.

For the two states the total timber stand has changed over the 9-year period as follows:

	Million cords
Total softwood growing stock:	− 2.7
Total hardwood growing stock	+13.0
All growing stock	+10.3

In both states, therefore, the forest is becoming increasingly hardwood in composition. But even greater evidence of this trend is apparent in certain parts of each state.

Trend by Regions: In Table 1 is shown the net change in softwood growing stock since 1937 in the major regions of each state. The coastal plain of North Carolina has experienced a slight gain and also the mountain region but in the piedmont, which occupies a wide area across the central part of the state, a rather severe decline in softwood volume has taken place. The 2.1 million cord decrease is equivalent to the total wood requirements of the four pulp mills in the state for over 2.5 years. Although pulpwood cutting contributed to this serious overcut to some extent, the leading offenders were the hundreds of small portable sawmills that have removed practically all the pine timber from large areas.

In South Carolina, an even greater decrease in softwoods took place in the northern coastal plain lying northeast of the Santee River—3.4 million cords, or 11 per cent of the entire growing stock. This is the amount of wood that South Carolina's pulp mills consume in about four years. A smaller decrease occurred in the southern coastal plain, but for the coastal plain as a whole it is obvious that saw timber, pulpwood, and forest products have been cut much faster than the timber was replaced through growth. The state-wide balance is helped by the increase of 2.6 million cords in the piedmont, but annual balances of growth and drain show that the margin is gradually narrowing and, if present trends continue, drain will soon exceed growth in that area. This has been largely brought about by the heavy increase in pulpwood drain which started about 1940 in several piedmont counties.

With only one exception the total hardwood growing stock has increased in all regions in both states (Table 2). The only reduction occurred in the northern coastal plain of South Carolina where flooding of a large area of hardwood saw timber for a power development and the intensive utilization of large hardwoods for lumber,

Table 1—Net change in volume of softwood (including cypress in the coastal plain) growing stock in trees 5 inches d.b.h. and larger, by regions, 1937 to 1946

North Carolina

Item	Regions			State
	Coastal plain	Piedmont	Mountains	
	M cords	*M cords*	*M cords*	*M cords*
Growing stock Jan. 1, 1937..	67,382	35,181	8,727	111,290
Growing stock Jan. 1, 1946..	68,035	33,092	9,180	110,307
Net change.....	+653	−2,089	+453	−983
Per cent	+1.0	−5.9	+5.2	−0.9

South Carolina

Item	Regions			State
	Southern coastal plain	Northern coastal plain	Piedmont	
	M cords	*M cords*	*M cords*	*M cords*
Growing stock Jan. 1, 1937..	21,152	30,210	19,513	70,875
Growing stock Jan. 1, 1946..	20,198	26,822	22,105	69,125
Net change.....	−954	−3,388	+2,592	−1,750
Per cent	−4.5	−11.2	+13.3	−2.5

Table 2—Net change in volume of hardwood growing stock in trees 5 inches d.b.h. and larger, by regions, 1937 to 1946

North Carolina

Item	Regions			State
	Coastal plain	Piedmont	Mountains	
	M cords	*M cords*	*M cords*	*M cords*
Growing stock Jan. 1, 1937..	41,473	24,075	17,653	83,201
Growing stock Jan. 1, 1946..	44,400	27,846	20,460	92,706
Net change.....	+2,927	+3,771	+2,807	+9,505
Per cent	+7.1	+15.7	+15.9	+11.4

South Carolina

Item	Regions			State
	Southern coastal plain	Northern coastal plain	Piedmont	
	M cords	*M cords*	*M cords*	*M cords*
Growing stock Jan. 1, 1937..	18,159	25,750	10,227	54,136
Growing stock Jan. 1, 1946..	21,254	24,630	11,796	57,680
Net change.....	+3.095	−1,120	−+1,569	+3,544
Per cent	+17.0	−4.3	+15.3	+6.5

veneer, and furniture together resulted in a 4 per cent decrease in the growing stock.

Significance to the Pulp and Paper Industry

If the foregoing discussion reflects accurately the changes that are taking place in the timber stands of the Carolinas, then the pulp and paper industry has cause for concern. As has been pointed out, the volume of softwood has decreased nearly 3 million cords in nine years, while the hardwoods have increased 13 million cords in the same period. Also a high proportion of the young seedlings growing into pulpwood sizes are hardwoods, many of them species that are not now generally utilized for pulp. This means, as has been already pointed out, that many of the pine stands are slowly converting to hardwoods.

In the face of this fairly rapid decline in the softwood resource, existing pulp mills are expanding plant capacities, usually to use more pine, but in a few instances to use relatively small quantities of hardwoods. In addition, other companies are investigating the possibility of erecting new plants to use pine and at least one that will draw in part upon the pine stands of South Carolina is already under construction. Added to this is an expected increase in the amount of softwoods that will be put into construction lumber, for the 4,500 sawmills in the Carolinas are able to compete effectively with pulpwood producers for the smaller timber sizes. All of this adds up to a continued decrease in the supply of pine timber, resulting in more expensive pulpwood.

There are ways, however, in which this dark picture can be brightened. Greater use of hardwoods is one approach, for growth of all hardwood species now exceeds drain by more than one million cords per year. Along the coast there are areas of nearly 14 million cords of sweet and tupelo gums in cull trees, unsuitable for saw timber but eminently suitable for certain kinds of pulp. Greater use of logging and manufacturing waste particularly pine, offers another opportunity. Recent surveys indicate that lumber concentration yards within an 80-mile radius of Columbia (S. C.) produce the equivalent of 90,000 cords of wood in shavings, and comparable quantities are produced in at least one area in North Carolina. Small quantities already are being used in commercial pulp operations.

To sum up the general picture, it is quite plain that further expansion of large-scale wood-using industry in the Carolinas is undesirable as long as the present depletion of forest growing stock continues. Industrialists contemplating new or expanded plants in the area should recognize first of all the fact that pine growing stock is being steadily overcut, and has been overcut for many years.

This does not mean that there are no new possibilities. There are many, but they involve the use of wood waste, of hardwoods, and of cull trees as source of raw material to support new plants. The greatest possibilities of all lie, of course, in the field of increased growth. The South is the land of quick growth, and it could nearly double its growth of valuable pine. The time has come for industry and for the farm owners of some 16 million acres in the Carolinas to start growing timber to supply an expanding market. What is necessary is universal acceptance of the hard fact that the pioneer days are finished and the era of skimming the cream is over. The timber used to be there for the taking, but in the future it will have to grow by means of intensive forestry practices on all classes of ownership.

Summary of Mexican Paper Industry

ROBERT S. ARIES and JOSE SERRANO, JR.*

▶▶▶ IF THE SHEETLIKE materials of the Mayas and the Aztecs—*huun*-paper of the Mayas, *amatl*-paper of the Aztecs, can be considered paper, then papermaking in Mexico antedates the Chinese invention. These sheets, some of them more than 30 feet long, were used for books and documents, and for religious, ceremonial, and decorative purposes. Yet, in the commonly accepted sense, they did not constitute *true* paper. True paper was not made in Mexico until shortly after the establishment of Mexican Independence in 1810.

The first paper mill in the country was erected during the early days of the Republic by Don José Manuel Zozaya Y Bermudez, who previously had been an ambassador from Mexico to the United States during the days of the Empire Regime. The mill, located in Chimalistal, San Angel, state of Mexico, made the paper which was used for the printing of the second constitution of Mexico.

About this same time, a clergyman of the convent of San Augustin in Queretaro, capital of the State of Queretaro, Miguel Molina by name, succeeded, at least experimentally, in making paper from maguey fiber. Then, in 1822, Don José Maria Manzo erected a mill in the city of Puebla for the making of rag paper. Rags were so scarce, however, that the mill was short-lived.

Three other early mills were placed in operation during or about 1845. One of these mills was El Batan in the state of Jalisco. Another of the three was owned by Senor Berazaluce and was located in Tizapan in the state of Mexico. The third mill, Belen, located in Tacubaya in the state of Mexico, was owned by Senores Benfield and Marshall.

The year 1857 found five paper mills in the country. One of the mills was in the state of Jalisco; the other four were in the state of Mexico.

In 1884, there were seven mills in Mexico. Two of them were in the state of Jalisco, one in the state of Veracruz, and the other four in the State of Mexico. One of the mills in Jalisco was located at Quadalajara, the other, in Capalpa. Cocolapan was the location of the mill in Veracruz; while Pena Pobre, Santa Teresa, Belen, and Tizapan covered the locations in the state of Mexico.

In 1879, Watson Phillips, of Rothschild and Sons, London, England, sold machinery for a new pulp and paper mill to J. H. Robertson y Cia. Later, this machinery was sold to Ahedo Cia, a firm founded by Andres Ahedo and José Sanchez Ramos. Upon installation of this machinery, the mill made its first paper in 1892.

Two years later, in 1894, the firm of Ahedo y Cia was dissolved, and Compania de las fabricas de Papel de San Rafael y Anexas was formed as its successor. Another mill, commonly known as the Loreto, was erected in 1906 by Don Alberto Lenz in San Angel in the Federal District.

The value of manufactured products for the industry amounted to about 15,000,000 pesos (about $3,100,000) in 1925. That same year, the mills of greatest importance were San Rafael y Anexas, Loreto Y Pena Pobre, and El Batan.

In 1925, the San Rafael mill employed 187 men and produced 21,500 tons of paper.

The domestic industry was able to supply the home market in 1928. Production that year was valued at 13,750,000 pesos or about 2,840,000 (1) Mexico Economico 1928-30 Estadistica de la oficina de Estudios Economicos de los Ferrocarriles Nacionales de Mexico. Editorial Cuttura Mexico 1932. page 86)

Table 1 lists the names and locations of the various mills of the industry at the close of 1946.

Forest Resources

The range in latitude of Mexico is from about 14° 30′ to about 32° 30′ north, a distance of 1,250 miles or almost a distance comparable to the latitude range of the United States.

From eastern Yucatan to western Baja, California, is a distance of almost 2,000 miles or about 30° of longitude.

The range in altitude of Mexico extends from sea level to about 18,000 feet. Because of this wide variation in topography as well as the geographic location of the country itself, the character of the forest flora is greatly diversified.

Broadly speaking, the forests are divided into five principal types (1): namely, forest of the desert and high plains region, coastal forest, evergreen tropical hardwood forest, forest of the subtropical transition belt, and coniferous forest. Only the latter two types are considered of importance as sources of supply of softwoods for the pulp and paper industry.

The subtropical transition forest occupies a belt along both the east and west escarpments of the tropical forest, and extends up to about 7,000 to 7,500 feet where the true Sierre Madre forest begins. Subtropical species appear in this forest at elevations as low as 2,600 feet, but are not common below about 4,000 feet.

The tropical forest is rather typified by evergreen oaks, which, toward the upper limits of the region, give way to deciduous oaks. Likewise, other tropical hardwoods drop out and are replaced by various deciduous species, such as liquidambar, cherry, sycamore, walnut, and elm.

The timber stands of the subtrop-

Wood Pulp Production in Mexico by Kind and Year (Quantities in short tons)

Kind	1942	1943	1944
Wood pulp, total	26,711	33,044	33,602
Groundwood	19,578	22,155	23,131
Unbleached sulphate	3,333	8,127	6,062
Unbleached sulphite	3,800	2,762	4,400

From Forest Service Reports (United States of America)

Paper Production in Mexico by Kind and Year (Quantities in short tons)

Kind	1940	1941	1942	1943	1944	1945*
Wrapping	32,100	36,000	37,300	40,020	46,500	39,100
Printing	20,400	24,700	20,600	22,950	20,820	17,550
Waterproof	222	420	488	592	446	485
Writing	4,610	3,400	4,210	8,250	9,240	8,700
Toilet	800	936	1,385	1,700	1,450	1,380

* Production only to October. . . . *From Direccion General de Estadistica Mexico D. F.*

(*) Mr. Serrano was sent to the Polytechnic Institute of Brooklyn by the Banco de Mexico to study American techniques in wood utilization and in pulping under the direction of Dr. Aries.

Table 1—Mexican Mills*

Atenquique, cia. Industrial de, S. A., Atenquique, Jalisco—Unbleached sulphate pulp, 160,000 pounds, 24 hours; kraft bag and wrapping paper, 240,000 pounds, 24 hours.

Cartonera Atlas, S. de R. L., Mexico, D. F.—Corrugated board. (Mill under construction.)

Cartonera Industrial, La, Mexico, D. F. (Mill at Mexico-Laredo)—Cardboard, Bristol paper. 60,000 pounds, 24 hours.

Chihauhau, Papelera de, S. A., Apartado Postal 1—Wrapping paper and board; 60,000 pounds paper and 5,000 pounds board, 24 hours.

Compania de Las Fabricas de Papel, Mexico City—Two mills: San Rafael and Progreso Industrial. Writings, printings, coated, loft-dried bonds, cover, rag, bonds, lithographic art, wrappings, rotogravure, etc., 50,000 pounds, 24 hours. Pulp mills: groundwood, 450,000 pounds; bleached sulphite, 20,000 pounds; unbleached sulphite, 75,000 pounds; rag, 15,000 pounds, 24 hours.

Coyoacan, Fabrica de Papel, S. A., Coyoacan, F. C.—White and colored printings and board, Bristol boards, bond, white and colored copying papers, bogus Manilas, mimeograph and kraft wrappings; 77,000 pounds, 24 hours. Also groundwood mill, 22,000 pounds, 24 hours.

Fabricas de Papel, S. A.; Loreto mill, San Angel, D. F.; Pena Pobre mill, Tlalpam, D. F.—Toilet tissue, poster, bag, printing, waxed and wrapping papers, 140,000 pounds, 24 hours. Groundwood mill (San Angel and Tlalpam), 45,000 pounds, 24 hours. Sulphate pulp mill (Tlalpam), unbleached sulphate, 70,000 pounds, 24 hours.

La Aurora, S. A., Mexico City—Book, magazine, bond, Manila, wrapping, blotting, and printing; 27,000 pounds, 24 hours. Groundwood mill, 21,000 pounds, 24 hours. Soda pulp and semichemical pulp mill, 16,000 pounds soda fiber and 16,000 pounds semichemical fiber, 24 hours.

Monterrey, Fabrica de Papel de, S. A., Monterrey, N. L.—Gray wrapping paper, gray board, kraft board.

Negociacion Papelera Mexicana, S. A., Mexico City—Ordinary and medium grades of wrapping, cardboards and Bristols.

Titan, Empaques de Carton, S. A., Monterrey—Kraft liner and .009 strawboard, 15 metric tons 24 hours.

Two New Projects in Monterrey—The Cuahutemoc Brewery which just started to manufacture nine-point and 16-point papers for corrugated boxes, will use the output of the 25-ton per day mill for its own use. The brewery also plans to make straw pulp soon and to mix it with kraft.

Productora de Papel, S. A., plans to put a paper mill into operation this year. Two fourdriniers were installed last year by Sandy Hill Iron and Brass Works. It is expected the mill will produce 80 tons of kraft pulp per day; later, operations may be extended to include napkins and fine papers. The company has tentative plans to build a pulp mill in 1948.

* Compiled from *Lockwood's Directory of the Paper and Allied Trades.*

ical transition region are more regular, and are composed of fewer species than the tropical forest.

The coniferous forest region, hitherto largely undeveloped because of its location, is the most extensive and important forest region of the country. In this region, oaks predominate up to about 7,000 feet. However, pines begin to be fairly numerous at 4,000 feet. From about 7,000 feet to more than 10,000 feet, the pines predominate.

The number of species of pine in the region has been estimated at upward of 20. Included in these species are both white and yellow pines.

Some of the pines reach comparatively large sizes. Diameters of from three to five feet or more, and heights of from 100 to 150 feet are not uncommon.

The forest stand yields from 2,000 to 40,000 board feet per acre. The yield over extensive areas average from 5,000 to 8,000 feet.

The pine forest covers a region about 800 miles long and from 40 to 150 miles wide on the Sierra Madre Occidental. It extends from the Arizona boundary southward through the states of Chihuahua, Sonora, Durango, Jalisco and Michoacan. Another belt occurs on the Sierra Madre del Sur. This forest runs through the states of Guerrero, Oaxaco, Chiapas, and across the southern boundary of Mexico into Guatemala.

There is also a narrow belt of coniferous forest on the Sierra Madre Oriental that extends from the state of Nuevo Leon southward to the state of Puebla. In the north and at the lower elevations, the forest is composed of chaparral, oaks, junipers and pinon pines. At somewhat higher elevations appear rather open stands of Chihuahua pines; and higher still, the heavier stands of yellow and white pines, with scattered Douglas fir, white fir and spruce, especially on north exposures.

Cypress (*cupressus spp*) is fairly common in the central part of the country. A bald cypress (*taxodium mucronatum*) was abundant in years past; but much of it has been cut.

There are two forest tracts in northern Baja, California, which together total about 250,000 acres. These tracts are an extension of the California forest of yellow pine, sugar pine, incense cedar, lodgepole pine, and big cone fir.

The best pine timber is in a belt between about 8,000 and 10,000 feet elevation. Some pines appear up to an elevation of 14,500 feet; but firs are more numerous above 10,000 feet.

Table 2 shows the acreage and estimated volume in board feet of the pine timber within the country by states.

Accessibility of Coniferous Forest

Since the topography within the coniferous forest belt is very rough, transportation in the region is very primitive. Highways and railroads are almost nonexistent. Transportation is largely by pack mule over mountain trails.

To open up the forest for exploitation will require the construction of adequate transportation facilities. Both railroads and highways must be built, the highways serving as feeders to the rail lines. It is questionable, however, if the potential traffic of the coniferous forest would justify the high initial investment that would be required for such construction purposes. Forest products alone hardly could be expected to produce enough revenue to permit profitable operation of railroads or even to keep a system of good highways in repair.

Most authorities agree that the softwood forest areas of Durango and Chihuahua are the most suitable for potential exploitation (2).

Transportation

With the exception of a very few rivers, such as the rio Hondo, the rio

Uscimacinta, the rio Grijalva, and the rio San Pedro, Mexico has no navigable waterways which could be utilized for the transportation of logs and lumber. In the southern section where the rivers tap forested regions, the unhealthy tropical climate is not conducive to the development of the lumber industry. In the north, they traverse barren desert regions. Moreover, due to the mountain chains which encircle the plateau, the streams must cut their way in their lower courses through narrow gorges to the sea.

The main highways of Mexico (*3*) consist of the following: From Mexico City to the United States border, passing through the western part of Hidalgo and crossing through the states of San Luis Potosi, Tamaulipas, and Nuevo Leon; from Mexico City to Acapulco on the Pacific coast, passing through the Federal District and the states of Morelos and Guerrero; from Mexico City to Guadalajara, passing through Toluca in the state of Mexico and the Morelia region of the Mexican lakes; from Mexico City to Veracruz; from Monterrey in the state of Nuevo Leon to Saltillo and Torreon in the state of Coahuila, extending to the border and to the state of Durango; and from Monterrey to Reynosa in the state of Tamaulipas and to Matamoros at the Mexican-United States border just across from Brownsville, Texas.

Of these main arterial highways, only the highway going from Mexico City to Acapulco cuts through dense forest areas.

In 1939, the railroad mileage of Mexico totaled 14,494 (*4*). Since 1939, little has been done to extend the mileage because of the scarcity of materials due to World War II.

Several railroad lines have been projected.

One line is projected to run southeast from Puerto Mexico in the state of Veracruz to Campeche in the state of Campeche. This line, when built will open up the rich tropical timber areas of Veracruz, northern Chiapas, southern Tabasco, and Campeche for development.

Table 2—Areas and Volume of Pine Timber by States in Mexico*

State	Pine Timber (1,000 acres)	Estimated Volume (1,000 bd. ft.)
Lower California (Northern Part)	25.7	65,190
Coahuila	206.1	792,517
Chiapas	34.6	140,338
Chihuahua	1,238.7	2,679,574
Federal District	9.9	19,281
Durango	1,380.5	4,860,336
Guanajuato	17.3	37,786
Guerrero	22.2	205,633
Hidalgo	35.3	150,543
Jalisco	183.8	295,719
Mexico	232.0	1,008,170
Michoacan	400.8	1,799,000
Morelos	9.1	5,085
Nayarit	43.2	25,920
Nuevo Leon	172.5	530,416
Caxaca Puebla	74.9	141,785
Puebla	100.8	362,568
San Luis Potosi	65.5	142,033
Sinaloa	31.1	212,625
Sonora	62.8	169,220
Tamaulipas	202.6	269,940
Tlaxcala	15.1	33,089
Veracruz	260.4	969,440
Zacatecas	44.0	14,867

* Adapted from data in Consular Report Pine Timber Resources of Mexico, July 14, 1939, pages 2 and 3. (1 hectare equals 2.47 acres; 1 cubic meter equals 424 bd. ft.)

A second project of importance is contemplated to connect Ixcaguitla in the state of Puebla with the bay of Chacahua on the Pacific ocean. This line too will open up forest regions which up to now have been closed to development.

A third project plans to connect El Fuert in the state Sinaloa with Sanchez in the state of Chihuahua. Such a line would open up and bring into the active market the pine forest situated on the western slopes of the Sierra Madre Occidental in western Chihuahua.

Future of Pulp and Paper Industry

It is doubtful if any industry has a more promising future in Mexico than pulp and paper.

Mexico is now in an active era of industrial and cultural development. During the past five years the number of books published has increased about 100 per cent. In this same period, the consumption of newspapers has increased about 30 per cent; of paper bags, about 50 per cent; of toilet paper, about 100 per cent; of waxed paper, about 25 per cent; of gummed paper products, about 400 per cent; and of facial tissues and handkerchiefs, about 400 per cent.

It is very probable, even with several new mills in operation, that the consumption of all kinds of paper and paper products will exceed production by more than 100 per cent in another five years.

References

(1) *Forest Resources of the World,* Raphael Zon and William N. Sparhawk, McGraw-Hill Book Company (1923).

(2) *Forest Resources and Lumber Economy of Mexico,* Bureau of Foreign and Domestic Commerce, Oct., 1945, Vol. 3, Part 6.

(3) *Communications and Transportation,* Javier Sanches Mejorada, *Annals of the American Academy of Political and Social Science,* March, 1940, page 81.

The Gair Company

W. F. HOWELL, Secretary
Robert Gair Company, Inc.

▸▸▸ THE BOOKS THAT MAKE up the Gair Business Library do not comprise what might be called a relatively large collection. However, the library appears to fill the requirements of the personnel of the company for extra-curricular reading. The library is composed of books on the industry, the company, the products of the company, production, sales, advertising, economics, office routines, management, and general reference books, directories, etc. Departments which are highly technical, such as papermaking, accounting, and research, maintain their own specialized libraries—available, of course, to anyone who wishes to delve deeply into these subjects—and the general library, maintained in the general office for the use of all personnel is confined, in the main, to books of general business interest.

The scope of the library being limited and not extensive enough to warrant as yet a full-time librarian, it was deemed wise for the present to employ the simplest method of indexing and operation. Accordingly, a system was devised whereby the books are arranged and placed by general subjects such as advertising, economics, folding cartons, marketing, psychology, taxation, etc., and indexed by these general subjects, and by authors and by titles. A specially designed bookplate is placed in the front of each book, and a pocket is attached inside the back cover to accommodate a card upon which borrowings are recorded. When a request for a book is received, the part-time librarian removes the card, records borrower, his department or division, and the date. Unless other requests are received for the book, the borrower is allowed a liberal time for reading, but if the book is not returned in about a month, it is followed up. Under this very informal method of operation, and with the library open at all times without constant supervision, a book is occasionally mislaid or lost, but until the extent of the library warrants a full-time librarian, the cost of a few books is obviously much less than that of an additional full-time employee.

New additions to the library are published in the employee magazine, *Gair News*. A complete mimeographed index of the library was recently sent to all divisions, and it is the intention to keep this up to date by monthly supplements of lists of new books.

The library was started some years ago by providing adequate space for the housing of business books which were bought by individuals but were worthy of wider circulation. Several executives have more than a passing interest in the library and hold themselves responsible for recommending new books as they come to their attention. Business book publishers also supply lists. Generally, it is the company's policy to purchase and add to the library any business book, not already in the collection, which is requested by any employee if the book is of general interest. It is believed that all possible facilities should be afforded those who are willing to use their extra time to acquire a better understanding of their present job or to prepare for the better one ahead. Although limited in scope, and covering a field with a relatively small bibliography, the collection grows—slowly but steadily.

Business Library

PARTIAL LIST OF BOOKS

The variety of material obtainable for a business library is indicated by the following partial list of books in the business library of Robert Gair Company.

Abbreviations

A dictionary of abbreviations (1943), Herbert John Stephenson.

Advertising

Advertising its principles and practice (1919), Harry Tipper, Harry L. Hollingworth, George Burton Hotchkiss and Frank Alvah Parsons.

Brad-Vern's reports — 1944 *annual book*, Printers' Ink Publishing Co, Inc.

A case example in public relations, Paul Garrett.

Colour in advertising (1934), Joseph Binder.

The economic effects of advertising (1942), Neil H. Bordon.

Facts about the use of the flag in advertising (1943 Revised), National Better Business Bureau, Inc.

How to write advertising (1937), Kenneth M. Goode.

Problems in Marketing (1931), Melvin Thomas Copeland.

Public relations for business (1939), Milton Wright.

You and your public (1943), Verne Burnett.

Annual Reports

All the children (1935-36), Harold G. Campbell Board of Education City of New York.

Gair, Robert Company, Inc.

Making the annual report speak for industry (1938), James P. Selvage and Morris M. Lee.

Banks and Banking

Business law for the business man (1916), Utley E. Crane.

Economics (1937), Fred Rogers Fairchild, Edgar Stevenson Furniss and Norman Sydney Buck.

Bibliography

Catalog of the library . . . (1941), Institute of Paper Chemistry.

Permanence and durability of paper. Morris S. Kantrowitz, Ernest W. Spencer and Robert H. Simmons, U. S. Government Printing Office (1940). An annotated bibliography of the technical literature from 1885 to 1939.

Pulp and papermaking; bibliography and United States patents (1939, 1940, 1941, 1942, 1943, 1944), Clarence J. West, Technical Association of the Pulp and Paper Industry.

Biography

Robert Gair: a study (1939), H. Allen Smith.

Canning

The canning clan (1938), Earl Chapin May.

The manufacture of fibre cans (1945), Board Products Publishing Co.

Catalogs and Directories

A.S.M.E. Mechanical Catalog and Directory (1943), American Society of Mechanical Engineers.

The baking industry blue book.

Chemical engineering catalog (1934), Reinhold Publishing Corporation.

Classified board mill directory (1940), Fibre Containers.

Dairy industries catalog (1939), Olsen Publishing Company.

Haynes directory of medicine and cosmetics manufacturers (1940), Chemic Press, Inc.

Lockwood's directory of the paper and allied trades (1938, 1942, 1945, traveler's edition 1933, traveler's edition 1934, traveler's edition 1944).

Modern packaging (1938, 1939, 1940, 1941), Breskin & Charlton Publishing Corp.

Packaging catalog (1931, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945).

Paper and pulp mill catalogue (1943, 1944-1945, 1945-1946, 1946-1947, Fritz Publications, Inc.

Plastics catalog (1943), Plastics Catalog Corp.

Post's paper mill directory (1941), L. D. Post, Inc.

Chemistry

The chemical and engineering dictionary, Chemical Publishing Co.

The condensed chemical dictionary (1942), Chemical Engineering Catalog.

Customers

Consumer engineering (1932), Roy Sheldon and Egmont Arens.

Public relations for business (1939), Milton Wright.

What makes people buy (1935), Donald A. Laird.

Economics

The background and economics of American papermaking (1940), Louis Tillotson Stevenson.

Economics of transportation (1944), D. Philip Locklin.

Harmony between labor and capital (1927), Oscar Newfang.

Principles of economics (1941, 2 vols.), Lewis A. Froman.

The road to serfdom (1944), Freidrich A. Hayek.

What industry is doing for America (1938), *Factory*.

Finance

Business and fundamentals; how to become a successful business man (1923), Roger W. Babson.

Investment fundamentals (1935), Roger W. Babson.

Managerial profit sharing (1928), C. Canby Balderston and Morris E. Leeds.

Folding Cartons

Corrugated boxes (used by Department and Specialty Stores). Simplified practice recommendation U. S. Commerce Department (1932).

Folding paper boxes an aid to profitable packaging (1939), James D. Studley, U. S. Commerce Department.

The golden anniversary of corrugated paper (1925), The Thompson and Norris Company.

A history of the progress of the folding box industry (1939), Harvey A. Harkaway.

Sealing of corrugated and solid fibre containers (1938), J. D. Malcolmson.

The story of the weatherproof solid fibre box (1946), Weatherproof Solid Fibre Box Group.

Food

Containers used in shipping fruits and vegetables, U. S. Agriculture Department, Farmers' Bulletin No. 1579.

Dehydrated food directory (1945), National Dehydrators Association.

Packaging and shipping practices in the food industries, McGraw-Hill.

Quick frozen foods directory (1945-46).

Thomas wholesale grocery and kindred trades register (1945), Thomas Publishing Company.

Forestry

Chemical utilization of wood (1932), Henry K. Benson, U. S. Commerce Department.

Forestry and paper (1943), P. H. Glatfelter Co.

BUSINESS LIBRARY

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Forests in the economy of the South (1939), I. F. Eldredge, Southern Forest Experiment Station.

Identification and microscopy of woods and wood fibers used in the manufacture of pulp (1934), Ellwood S. Harrar and J. Elton Lodewick.

Knowing your trees (1937), G. H. Collingwood, American Forestry Association.

Paul Bunyan's quiz, American Forest Products Industries, Inc.

The place of forests in a land-use program for the South (1937), Southern Forest Experiment Station.

Profitable management of shortleaf and loblolly pine for sustained yield (1937), Southern Forest Experiment Station.

The work of the Southern Forest Experiment Station and its application to private forest management (1937), Southern Forest Experiment Station.

Gair, Robert, Company, Inc.

Advertising booklet

Annual reports of

Booklets, reprints, circulars

Deka-log of the Gair old-timers

Gair news

Robert Gair; a study (1939), H. Allen Smith

Scrapbooks (1935, 1936, 1937)

Through the years, Wilbur F. Howell

Government and Politics

Business and defense coordinator (1942), Research Institute of America.

Our bill of rights; what it means to me (1941), Bill of Rights Sesqui-Centennial Committee.

Public control of business (1940), Harlan Fiske Stone.

Washington is like that (1942), W. M. Kiplinger.

House Organs

How to edit an employee publication (1944), Garth Bentley.

Printers' Ink directory of house organs (1944).

Industries and Commodities

The American Tobacco Company and its service to the public.

A century of achievement, Colt's Patent Fire Arms Manufacturing Co.

The Gardner-Richardson Company.

George Westinghouse 1846-1914 (1946), Westinghouse Electric Corporation.

A line of men one hundred years long, Rice, Barton & Fales, Inc.

75th anniversary (1945), The Standard Oil Company (Ohio).

The social problems of an industrial civilization (1945), Elton Mayo.

Ink

Back to the word; a story of ink (1940), Inter-Chemical Corp.

Carton Inks, Eagle Printing Ink Co.

Labeling

Pitfalls in package production (1940), American Management Association, Production Series No. 120, see "Labeling," by Albert R. Keene, p. 20.

Successful bottle labeling (1941), National Adhesives Corp.

Labor

Arbitration in action (1941), Frances Keller.

The employer and his labor relations (1941), John H. Mariane.

Pattern for survival (1943), Everett R. Smith.

The social problems of an industrial civilization (1945), Elton Mayo.

Statistical abstract of the United States (1932), U. S. Commerce Department.

Law

Insurance law (1922), Amasa J. Parker, Jr.

Legal effects of military service (1943), Ganson J. Baldwin.

Patent tactics and the law (1939), Roger Sherman Hoar.

Sources of information on legislation (1940), U. S. Library of Congress.

Trade practice rules for the folding paper box industry (1940), Federal Trade Commission.

Machinery

Biennial census of manufactures, U. S. Commerce Department.

The new encyclopedia of machine shop practice (1941), George W. Barnwell.

Paper and pulp mill catalogue (1943, 1944-45, 1945-46, 1946-47), Fritz Publications, Inc.

Practical helps for the mill man (1929), *The Paper Industry*.

Taming our machines (1931), Ralph E. Flanders.

These tremendous years 1912-1937 (1937), Neil M. Clark.

Management

Employers and their greatest asset (1937), Karl M. Wehinger.

Harmony between labor and capital (1927), Oscar Newfang.

How to manage an office (1914), A. W. Shaw Company.

Office management (1943), John H. MacDonald.

Problems in sales management (1925), Harry T. Rosdal.

The technique of executive control (1942), Erwin Haskell Schell.

What the employer thinks (1927), J. David Houser.

Marketing

Developing marketable products and their packagings (1945), Ben Nash.

How may the manufacturers' marketing policies be improved? (1933), Alice L. Edwards, L. D. H. Weld, Godfrey M. Lebhar, and Paul T. Cherington.

More markets for wood through research, American Forest Products Industries.

Problems in marketing (1931), Melvin Thomas Copeland.

The science of marketing by mail (1924), Homer J. Buckley.

Packaging

The art of packaging (1937), D. E. A. Charlton.

Bonnell's manual on packaging and shipping (1941), C. M. Bonnell, Jr.

Corrugated and fiber container situation (1943), Address by J. D. Malcolmson in American Pharmaceutical Manufacturers Association. Mid-year proceedings.

Handbook of useful information; Corrugated and Solid Fibre Shipping. Containers for Freight, Express and Parcel Post (1934), National Container Corporation.

History of packaging during world war II; set up paper boxes (1945), Packaging Institute

A history of the corrugated shipping container industry in the United States (1940), Wilbur F. Howell.

The manufacture of fibre shipping containers (1941, 1944), A. W. Werner.

Modern packaging encyclopedia (1946-47).

Packaging and shipping practice in the food industries, McGraw-Hill.

Packing for foreign markets (1924), John F. Keeley.

Paper, wasps and packages (1937), Alexander Weaver.

Trends in shipping container design (1933), J. D. Malcolmson and others.

260 mistakes to avoid in packaging (1939), Food Industries.

Paper Industry

Bleaching of sulphate pulp (1941), F. Leeschbrandt.

The foolscap rose (1934), Joseph Hergesheimer.

The golden anniversary of corrugated paper (1925), The Thompson and Norris Company.

Paper and its performance (1941), P. H. Glatfelter Co.

The paper and pulp industries of New York State (1942), Division of Commerce, N. Y. State.

Papermaking research (1934), Louis E. Wise.

Papermaking; the history and technique of an ancient craft (1943), Dard Hunter.

Permanence and Durability of Paper (1940), Morris S. Kantrowitz, Ernest W. Spencer, and Robert H. Simmons.

A Pictorial History of Paper, Stephen Goerl.

Pulp bleaching (February, 1936), *The Paper Industry.*

A short course in paper making (1939), P. H. Glatfelter Co.

Starch for paper coating (1947), Technical Association of the Pulp and Paper Industry.

Technical Association of the Pulp and Paper Industry, year book (1939-1940, 1940-1941, 1942, 1943, 1944, 1945, 1946, 1947).

Technical Association papers . . . (1940, 1943, 1944, 1945).

A Text-book of paper-making (1920), C. F. Cross and E. J. Bevan.

United States wood pulp statistics (1927-1938), U. S. Pulp Producers Association.

The wastepaper industry (1945), Harry J. Bettendorf.

West coast hemlock pulp (1938), Weyerhaeuser Timber Co.

Wood pulp statistics (1940, 1941, 1942), U. S. Pulp Producers Association.

Patents

Patent tactics and the law (1939), Roger Sherman Hoar.

Patents and invention (1942), NAM.

Personnel

The best years how to enjoy retirement (1946), Walter B. Pitkin, A. A. Wyn.

The Bolton award; ten prize winning essays on personnel problems (1945), John W. Bolton and Sons, Inc.

How to supervise people (1941), Alfred M. Cooper.

Public relations for business (1939), Milton Wright.

Plastics

Lignin and lignocellulosic plastics (1946), Clarence J. West.

Modern plastics (1936, 1937), Breskin & Charlton Publ. Corp.

Power

Electrical aids to greater production (1919), Allen M. Perry.

Printing

Back of the printed word; a story of ink (1940), Interchemical Corporation.

Carton inks, Eagle Printing Ink Co.

Handbook of photo-lithography (1935), New York Photo-Lithographers Association.

Production

Customer engineering (1932), Roy Sheldon and Egmont Arens.

Plant-production directory (1942), Industrial Directories, Inc.

Production, jobs and taxes (1944), Harold M. Groves.

Psychology

Industrial psychology (1942), Joseph Tiffin.

Practical psychology (1945), Karl S. Bernhardt.

The psychology of dealing with people (1941), Wendell White.

Public Relations

Making the annual report speak for industry (1938), James P. Selvage and Morris M. Lee.

Public relations for business (1939), Milton Wright.

Purchasing

Industrial purchasing principles and practice (1945), Howard T. Lee.

Research

Business organization (1932), Metropolitan Life Ins. Co. See No. 10 Sales research.

Marketing research agencies (1945), Ernest S. Bradford.

Organization for market research (1945), National Industrial Conference Board, Inc.

Sales

How to deliver a sales presentation (1938), Richard C. Bordon.

New roads to selling (1940), Harry Simmons.

A practical course in successful selling (1939), Harry Simmons.

Secrets of closing sales (1940), Charles B. Roth.

What makes people buy (1935), Donald A. Laird.

Shipping

Advertising and publishing production yearbook (1941), Colton Press, Inc.

Better shipping manual (1940, 1943), Shipping Management, Inc.

Bennell's directory of packing and shipping (1945), Bennell Publications, Inc.

Paper wrapped packages for parcel post and express shipment (1926), U. S. Commerce Department Domestic Commerce Series No. 3.

Shipping Containers

Containers used in shipping fruits and vegetables (1929), U. S. Agriculture Department, Farmers' Bulletin No. 1579.

Trends in shipping container design (1933), J. D. Malcolmson and others, American Management Association Job Order Production Series J.O.P. 6.

Social Security

Social Insurance and allied Services (1942), Sir William Beveridge.

Statistics

Elementary Statistics and Applications (1944), James G. Smith and Achesen J. Duncan.

Paperboard Industry Statistics (1927-1936), National Paperboard Association.

Statistical Classification of Imports into the United States with Rates of Duty (1943), U. S. Commerce Dept.

Surveys

Post War Market, Sales, and Industrial Progress Survey . . ., National Paper Box Manufacturers Association. Post-War Planning Committee (1945-1946); Third: Drug, chemical, and allied lines; Fourth: Paper products, stationery and allied lines; Fifth: Hardware, electrical and metal industries; Sixth: Department store and retail trade, and confectionery industry.

Taxation

Production, Jobs and Taxes (1944), Harold M. Groves.

Public Control of Business (1940), Harlan Fiske Stone.

Trade-Marks

The Lanham Trade-Mark Bill (1941), NAM.

Transportation

Commercial Air Transportation (1943), John H. Frederick.

Economics of Transportation (1944), D. Philip Locklin.

Water

Industrial Water for Pulp, Paper and Paperboard Manufacture (1942), TAPPI.

Women

Legal Status of Women in the United States of America (1938), U. S. Labor Department. Library has report for Illinois, Connecticut, Maine.

Workmen's Compensation

Medical Service in Industry and Workmen's Compensation Laws (1938), N. N. Newquist.

Year Books

American Society for Testing Materials (1936, 1940, 1941).

Public Relations Directory and Yearbook (1945), Public Relations Directory and Yearbook, Inc.

Standards Yearbook (1929), U. S. Commerce Department.

Technical Association of the Pulp and Paper Industry (1939-1940, 1940-1941, 1942, 1943, 1944, 1945, 1946, 1947).

Pulp and Paper Industry of Japan*

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▶▶▶ THE MANUFACTURE OF pulp and paper in Japan originated over one thousand years ago, and for centuries before paper was known to the western world the highly developed art of producing high-quality handmade papers was practiced. To present-day western peoples, the manufacture of pulp and paper by hand methods was and is nothing more than a quaint household industry. The development in the 80's of methods of utilizing wood fiber for paper led to the introduction of foreign-style paper to Japan and in turn to the development of the domestic machine-paper industry of recent years.

The advent of the machine-paper industry came in 1872 with the formation of a joint stock company, the Oji Seishi Kabushiki Kaisha (Oji Paper Manufacturing Company). This was the first company in Japan to produce European or "foreign-style" paper as distinguished from handmade or "Japan paper." The natives of Japan accepted the foreign-style papers as supplemental to, rather than a replacement for, the conventional hand papers, and the machine industry enjoyed a moderate growth for a number of years. Commercial significance on a world scale was attained for the first time under the impetus of shortages caused by the World War of 1914, resulting in the development of a domestic pulp and paper industry which in 1940 was the largest in the Orient and which placed Japan among the leading pulp and paper producing nations of the world.

The proper use of wood resources in Japan is extremely important to the existence of its population because of the high concentration of people per unit area of its land and the great dependence on such forest products as fuel, charcoal, and lumber. Industries converting wood to pulp consume much less wood than certain other wood-using industries such as lumber and charcoal; the consumption of wood by pulp mills has not exceeded about 15 per cent of the total wood consumption in any year.

Early pulp mills were located chiefly on the island of Honshu, but because of the abundant supply of desirable coniferous woods in northern lands, much of the new production capacity moved to Hokkaido and Karafuto. Owing to the ever-increasing demands of the paper industry, a considerable portion of pulp requirements was met by importation, but by expanding pulp producing facilities Japan attained virtual self-sufficiency in paper pulp by 1938.

In the 30's, the rayon industry emerged as another large consumer of pulp and its needs were at first imported because Japan had neither the capacity nor the industrial technique to produce quality rayon pulp. Soon after 1933, the domestic production of rayon pulp was developed and had a phenomenal growth until 1941.

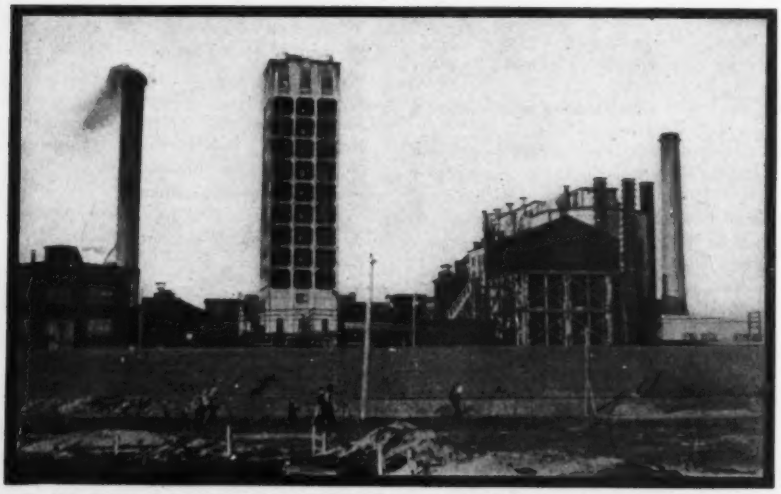
The sulphite and groundwood pulp processes were the first to be extensively used in Japan. Kraft pulp was originally made in Karafuto, and the manufacture of kraft and soda pulps was not developed in Japan proper until about 1938. Soda pulp was produced in numerous small and inefficient mills, which yielded an inferior and nonuniform grade of pulp. As in the United States, straw is used chiefly in making paper boards and is processed by cooking with lime. Although some wastepaper was deinked, it usually was converted into paperboard without special chemical treatment.

Wood

Of estimated forest resources of 67 billion cubic feet in Japan proper (Hokkaido, Honshu, Kyushu, and Shikoku), about 19.2 billion cubic feet in Old Japan (Honshu, Kyushu, and Shikoku), and about 8.5 billion cubic feet in Hokkaido are composed of wood species commonly used for pulping. The preferred species are the spruce and fir (*yezomatsu* and *todomatsu*) which grow abundantly in Hokkaido, and the red and black pines (*akamatsu* and *kuromatsu*) of Old Japan. Other spcies used for pulping include beech and hemlock.

The volume of wood consumed for pulp manufacture was approximately 120 million cubic feet annually for a seven-year period up to 1944. The consumption of pulpwood by locality is shown in Figure 1. More than one-half of the total pulpwood used in Japan during the ten-year period up to 1945 was concentrated in Karafuto. Not all of the wood was pulped in Karafuto, and many mills on the other islands were dependent upon this peninsula for a source of high-quality pulpwood. The loss of Karafuto to the Russians, coupled with the loss of imports of both pulpwood and wood pulp greatly reduced the raw material available to the paper industry and other users of pulp. A severe shortage of both pulpwood and wood pulp, therefore, resulted.

Attempts are being made to make up present pulpwood deficiencies through the use of sawmill wastes. In some cases, pulp mill operations have



Sulphite pulp equipment Tomakomai mill, Oji Paper Manufacturing Co., Ltd.

(*)Material in this article was obtained by the author in 1946 on assignment to the Natural Resources Section, General Headquarters, Supreme Commander for the Allied Powers, Tokyo. Acknowledgment is made to Lt. Col. W. E. Cohen, Australian Scientific Mission, and Lt. M. L. Markell, Jr., U.S.A., for assistance in preparing this report.

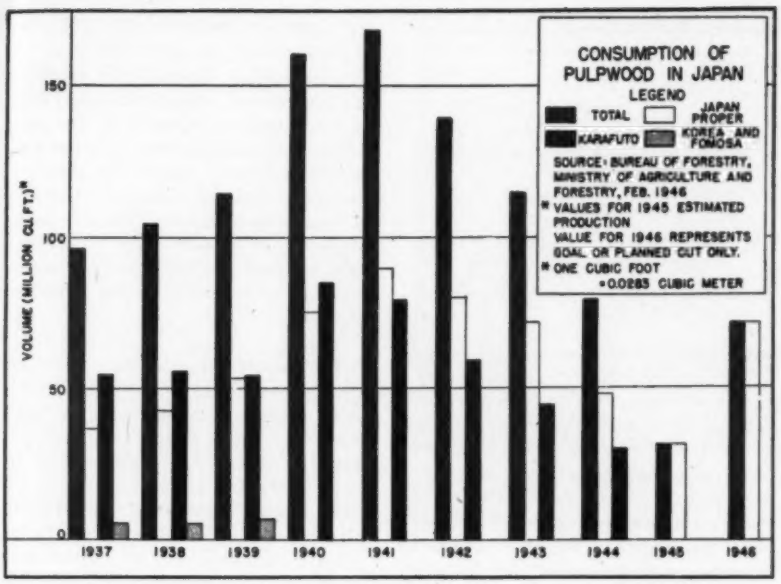


Figure 1

been integrated with sawmill operations to use slabs and edgings from lumber manufacture for pulping. Special small chippers with adapters to fit small miscellaneous material are sometimes used to reduce this wood to chip form. The bark of pulpwood is removed chiefly by hand, although the larger mills have drum-barking equipment. The logs are slashed after peeling and the largest sometimes reduced in size by a splitting device.

Present requirements for pulpwood to supply remaining pulp mills are affected by factors other than rated capacity, such as the ability of mills to consume wood despite present shortages of coal, chemicals, and other necessities. Future needs, therefore, are best considered in terms of past production and modified according to current shortages. From the standpoint of remaining pulp productive capacity, although a maximum output of nearly 900,000 short tons was attained in Japan proper in 1941, an estimated production of 600,000 tons, which approximates a past seven-year average, appears to be the maximum reasonable possibility after bomb damage is repaired, assuming adequate supplies of coal, wood and chemicals to be available. In addition, wood requirements are, of course, dependent on the proportions of the various pulps made.

On the basis of rated pulp mill capacity, the percentage capacity for each type of pulp has been estimated and if conversion factors for the calculation of wood volume per ton of pulp are applied to the assumed maximum production, the wood requirements would be over 70 million cubic feet annually. It should be emphasized that this estimate is given as a sample condition and that because of various shortages and altered emphasis on certain products the actual production is not likely to coincide with the indicated rated capacity of mills.

Production of pulpwood has been hindered by reluctance on the part of pulp mill operators to use less desirable wood species such as the hardwoods in mixture with long-fibered coniferous woods. A notable exception to this has been in the production of rayon pulp; for this product, beech in some proportion is considered advantageous. Technical advances for increasing the yield of pulp per unit volume of wood also appeared to be lacking.

Pulp

The yearly average volume of wood pulp available (production plus imports) for consumption by the paper, rayon yard, staple fiber, and other chemical industries of Japan for the years 1935 to 1942 was approximately 1,350,000 short tons. About 250,000 tons of this amount were obtained by importation. Nearly 45 per cent of the average domestic production and about 36 per cent of the total pulp available for this seven-year period had Karafuto as its source; small amounts were produced in Korea and Formosa. The production of all types of wood pulp and the magnitude of imports are illustrated in Figure 2. Although the over-all dependency on importation has not averaged over 21 per cent of the total for the years 1930 to 1940, an individual consideration of paper pulp and rayon pulp reveals the past dependency on imports of rayon pulp and the near self-sufficiency in paper pulp.

The loss of Karafuto is greater from a consideration of pulp types than is indicated from the over-all loss of tonnage because production in Karafuto was mostly of the important chemical pulps, notably sulphite and kraft. The rise and decline of production of chemical paper pulp, mechanical pulp, and rayon pulp since 1930 are shown in Figure 3. In the peak production year of 1941, a total of 1,407,993 short tons consisted of 619,132 tons of chemical paper pulp, 462,402 tons of mechanical pulp, and 326,459 tons of rayon pulp. Total pulp production for 1945 was only 255,657 tons, or about 18 per cent of the 1941 production and about 25 per cent of the rated production capacity of remaining mills.

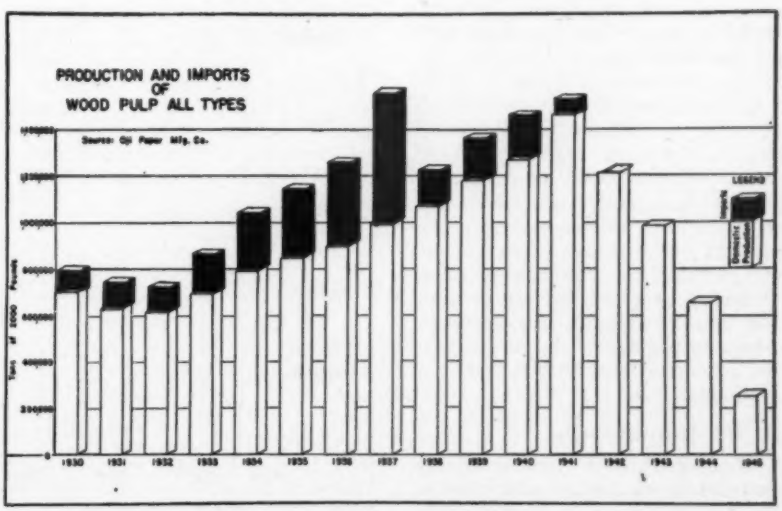


Figure 2

Table 1 (Source: Oji Paper Mfg. Co., Ltd.)

Type of pulp	Rated productive capacity (Jan. 1946)		1945 production	
	Per cent of total	Short tons	Short tons	Per cent of capacity
Mechanical	52	499,900	125,907	25
Sulphite	15	145,760	101,348	70
Rayon	24	230,600	11,422	5
Kraft	5	53,200	15,225	29
Soda	4	40,000*	1,755	4
TOTAL	100	969,460	255,657	

(*) Estimate.

Principal reasons for low production are shortages of coal, chemicals, and wood, and, to a lesser degree, bomb damage. Data on the production of pulp by types for 1945 and the rated productive capacities are given in Table 1. The equipment capacities given appear to be somewhat in excess of that substantiated by prewar records of the mills in Japan proper.

Because of the numerous fibrous raw materials used in the production of paper and paperboard, no simple factor is available for use in calculating the wood pulp requirements for total paper production. As an illustration, however, the fibrous materials consumed by the Japanese paper industry and the resultant paper products for 1941 might be considered. In that year, 1,211,321 short tons of wood pulp were used in the production of 1,668,765 tons of paper and paperboard, which is a proportion of about 0.73 tons of wood pulp per ton of paper and paperboard. On this basis, assuming a per capita consumption of paper at the approximate recent prewar level of about 30 pounds per annum, and assuming a population in Japan of 80 million, wood pulp requirements of the paper industry would be nearly 880,000 short tons per year. Requirements for rayon pulp for the production of rayon are about 1.17 short tons of pulp per ton of viscose rayon, and about 1.40 tons of pulp per ton of cupra-ammonium rayon ("Bemberg silk").

Of 93 pulp mills, eight have a capacity of over 30,000 short tons per year; 15 mills have a capacity of 10,000 to 30,000 tons; 30 mills, of 1,000 to 10,000 tons, and 40 mills produce less than 1,000 short tons per year. About 40 per cent of the total capacity is concentrated in five mills in Hokkaido.

A. Mechanical Pulp

Over one-half of the remaining pulp capacity is for the production of mechanical pulp. Mechanical pulp, in admixture with unbleached sulphite, is widely used in Japan for papers where permanence is not required, such as newsprint, school books, printing, and a variety of wrapping papers. Wood requirements for the manufacture of groundwood are more exacting than for some chemical processes, and the species which are most suitable for grinding are the spruce and fir (*yezomatsu* and *todomatsu*) of Hokkaido. In the central and southern regions where spruce and fir are not available red and black pines (*akamatsu* and *kuromatsu*) are used. Pulps produced by the grinding of pine are lower in strength, darker in color, and generally require longer drainage time for water removal in the manufacture of paper. The latter fact has resulted in an appreciable decrease in paper machine operating speeds, particularly in the high-speed machinery generally employed in newsprint manufacture.

Little or no hardwood is used in the production of groundwood. It is expected that experiments on the production of hardwood groundwood will be stimulated by severe shortages of the more desirable species. The use of groundwood in paper in as large a proportion as possible is to be encouraged in Japan where wood economy is of prime importance and power is reasonably abundant.

Average annual production for 1930 to 1940 was about 360,000 tons, representing about 44 per cent of the total production of all types of pulp made during this period. A peak production of 462,420 was reached in 1941. Nearly 88 per cent of the groundwood production of recent prewar years was centered in Japan proper. Since the loss of pulp sources in Karafuto was confined largely to chemical pulps, the result has been a substantial increase in the position of groundwood pulp in comparison with other pulp types. The proportion of groundwood to chemical pulp may be considered as an over-all evaluation of the quality of papers produced, and the increased proportion of groundwood capacity is likely to be reflected in the production of inferior papers.

Thirty-five mills are classified as producers of groundwood pulp. The total rated capacity of these mills, dis-

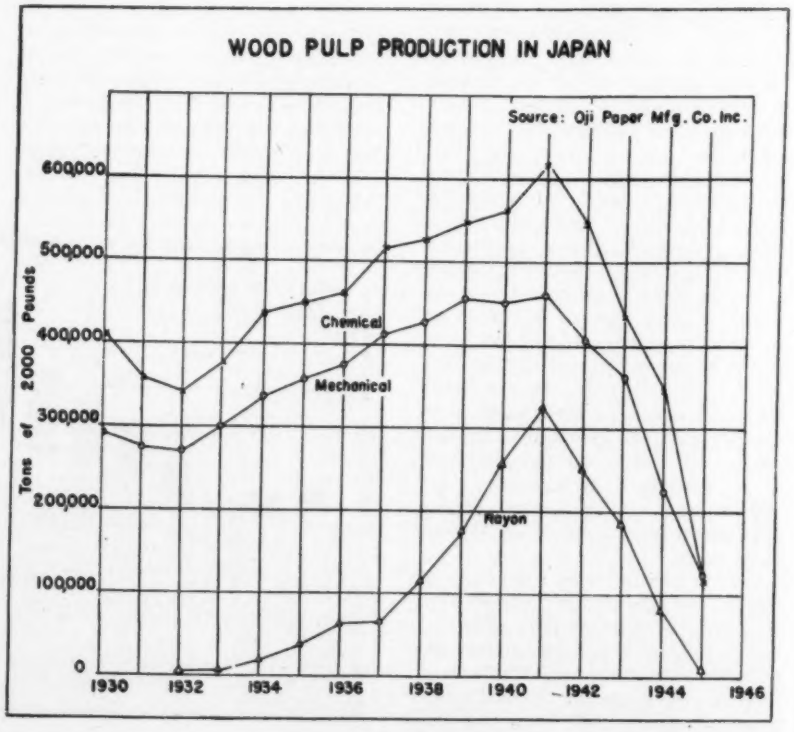


Figure 3

regarding bomb damage, is estimated to be about 500,000 short tons per annum. By far the largest mill is the Tomakomai plant of the Oji Paper Manufacturing Company, Ltd.; this mill has a rated capacity of 191,000 short tons of groundwood per annum. Two mills have a capacity of more than 30,000 tons per annum, 9 mills from 10,000 to 30,000 tons per annum, and 24 mills fewer than 10,000 tons per annum.

B. Sulphite Pulp

Sulphite pulp is the only chemical pulp produced in large volume for use in paper in Japan, and it is in great demand by the paper industry. It is an important total or partial constituent of such papers as newsprint, printing, bond, document, blueprint, wrapper, and paper bag. Before the war much sulphite pulp was bleached and used in high-quality papers, but, because of the lack of bleaching powder caused by the shortage of salt, the production of bleached sulphite at this time is very small.

Spruce and fir (*yezomatsu* and *todomatsu*) are considered superior for sulphite pulping. Because of the availability of these woods and of the raw materials, lime and sulphur, large sulphite pulping facilities were developed in Karafuto and Hokkaido. Sulphite pulp is also produced from red and black pines (*akamatsu* and *kuromatsu*) of Honsu and Kyushu, although the sulphite process is not generally considered to be well suited for pulping pine wood. In order to cook pine successfully in Japan and to minimize difficulties caused by resin in the wood, drastic cooking conditions are used. The pulp obtained is inferior in strength and brightness to that obtained from spruce, and the yield of pulp per unit of wood is lower.

The average production of sulphite paper pulp from 1930 to 1940 was about 390,000 short tons. This represents about 48 per cent of the total paper pulp for the same period. Much of the prewar production of sulphite pulp was concentrated in five mills of the Oji Paper Manufacturing Company in Karafuto. Over 65 per cent of the total domestic production of sulphite pulp during 1930 to 1940 was centered in Karafuto; about 5 per cent was produced in Korea. The total rated capacity of remaining mills, disregarding bomb damage, is 145,760 short tons per annum. It is evident that the loss of Karafuto as a source of pulp is particularly severe to consumers of sulphite paper pulp in Japan.

Nine pulp mills are classified as producers of sulphite paper pulp, but a certain amount of this type of pulp is also supplied by rayon pulp mills. The largest mill (Tomakomai, Hokkaido) has a sulphite capacity of 45,360 short tons a year. Four mills have a capacity of from 10,000 to 30,000 tons per annum, and four mills are rated at less than 10,000 short tons per annum. Three mills are situated in Hokkaido, three in Honshu, and three in Kyushu.

Largest rayon pulp mill in Japan. Kokusaku Pulp Industrial Co., Asahigam, Hokkaide

C. Rayon Pulp

Wood is the chief source of cellulose for the rayon industry in Japan. Nearly all rayon pulp is produced by the sulphite process with certain modifications in the process as it is used to produce paper pulp. Purification treatments to increase the alpha-cellulose content of sulphite pulp to the approximate 88 per cent required for viscose rayon manufacture include chlorination, alkali treatment, and bleaching.

The rapid growth of the rayon industry of Japan in the years preceding the war resulted in a heavy demand for rayon pulp. Although the production of rayon pulp was expanded at a much greater rate than that of any other type of pulp, domestic production did not keep pace with demand, and Japan depended heavily on imports of this product. Domestic production reached a peak in 1941 with the manufacture of 325,000 short tons, and imports of rayon pulp reached a high of 325,000 tons in 1937.

Consumption of cellulose by the rayon yarn and staple fiber industries of Japan, which in 1930 was less than 30,000 short tons, increased to a peak of nearly 400,000 tons in 1937. Although consumption of domestic pulp increased considerably each year through 1941, the dominant source was by importation until about 1938, after which consumption of domestic pulp exceeded that obtained by importation. Stimulus to the development of facilities for domestic production arose from the inability of the Japanese to obtain sufficient quantities of rayon pulp by importation in the years immediately preceding 1941. Nearly all of the rayon pulp consumed after 1941 was produced in Japan.

Small amounts of cotton were consumed by the rayon industry, but consumption did not exceed 7 per cent of the total cellulose used in any year. Because of its high alpha-cellulosic content, cotton was considered especially desirable in the manufacture of cuprammonium rayon, or "Bemberg silk," which is produced by one factory in Kyushu. For the same reason, cotton linters or cotton rags were also used in the manufacture of cellulosic derivatives, such as cellulose nitrate plastics, explosives, lacquer, coatings, films, artificial leather, rocket propellants, and dynamite. The technique in some cases was to produce a tissue paper from alpha-cellulose pulp and cut this paper into pieces of equal size to promote uniform nitration. Wartime effort on the part of the Japanese resulted in the development of techniques of purification of wood pulp to a degree considered suitable for cuprammonium rayon, plastics, and explosives, although perhaps inferior to cotton cellulose at the present stage of development.

The wood species used for the production of rayon pulp usually depends on the locality of the mill, although in past years considerable quantities of wood for pulping were shipped from Karafuto to mills on Honshu and Kyushu. Spruce and fir (*yezomatsu* and *todomatsu*) are the chief species used in Hokkaido, and mills in Honshu and Kyushu use chiefly red pine (*akamatsu*), black pine (*kuromatsu*), and beech (*buna*).

Although little or no hardwood is used in the production of paper pulp in Japan, the use of up to 40 per cent beech is considered desirable in the manufacture of rayon pulp by certain mills. Rayon pulp produced in Japan was generally considered inferior and of less uniform quality than pulps obtained by importation. During prewar years, imported pulp was usually employed to produce high-grade rayon for the export market, while the domestic production was used to supply Japans home needs for rayon yarn and staple fiber.

Domestic production of rayon pulp in Japan began in Karafuto as recently as 1932. Small amounts of pulp were obtained from Korea after 1936, but production in Japan proper did not begin until about 1938. In 1941, Karafuto and Korea contributed less than one-third of the total. The extremely rapid growth of this industry in Japan proper is thus illustrated. From a consideration of the strong situation of rayon pulp facilities in Japan proper, the present reduced capacity of the rayon industry, and the shortage of caustic soda for rayon manufacture, the remaining equipment capacity for rayon pulp manufacture appears to be in excess of the capacity of rayon plants to consume pulp. Assuming no imports of wood pulp, rayon pulp mills may be in a position to furnish the pulp requirements of the rayon industry and in addition to supply a certain tonnage of bleached or unbleached sulphite pulp to the paper industry.

Pulp mills producing rayon pulp are in general among the largest and most modern in Japan. The eight pulp mills in Japan proper listed in Table 2 are classified as producers of rayon pulp.

Aggregate equipment capacity after reconversion or repair of bomb damage is about 230,000 tons per year and this total was nearly achieved by these mills in 1941. Production for 1945 in Japan proper was only 10,900 tons, or about 5 per cent of remaining capacity. The scarcity of sodium hydroxide and coal for both pulp and rayon manufacture are the chief causes for the low production in 1945.

D. Sulphate Pulp

The sulphate or kraft process was adopted in Japan at a time when rapid expansion of the pulp and paper industry was taking place in Karafuto with the result that the modern kraft pulp industry was centered in that peninsula. Before 1939, nearly all of the domestic kraft pulp had Karafuto as its source. No kraft pulp was produced in Korea or Formosa. The average production of kraft pulp in Karafuto, and, therefore, in Japan, for the years 1930 through 1938 was about 48,500 tons per year which was only about 6 per cent of the total paper-pulp production for the same period. Imports of kraft pulp during this period averaged about 26,000 tons per year.

Production of kraft in Japan proper expanded from fewer than 11,000 tons in 1939 to a peak of about 25,000 tons in 1942. By the end of the war in 1945, the rated productive capacity of all Japan was 138,349 tons, but the combined capacity of remaining mills in Japan proper is only 53,220 tons. Thus it is readily seen that the loss of over 60 per cent of the kraft pulp capacity, coupled with the loss of imports, is of serious consequence to the kraft paper indusry and to industries which require products such as paper containers or multiwalled bags.

The wood species commonly used for kraft pulp are the spruce, fir, red pine, and jack pine. It seems peculiar that the kraft pulp industry, with its flexibility as far as wood requirements are concerned, should have been developed chiefly in the high-quality spruce and fir areas such as Karafuto and Hokkaido, while much of the sulphite pulping was developed in areas where pine woods are the predominant pulpwood.

Remaining kraft mills are operating under difficulties caused by shortages of coal, wood, and salt cake. Since strong and important kraft papers, such as the cement bag paper, were produced largely in Karafuto, the plant equipment and technical background to assume this burden in remaining mills has not yet been acquired. Operations observed in one of the largest kraft mills indicated that cooking procedures were yielding a pulp which would be considered of the semichemical type and which could not readily be prepared for strong papers by the cascades of Kollergangs or edge-runners used as refiners. It is fortunate for the Japanese that his mode of living thus far has not included dependency on large tonnages of containers or grocery bags.

E. Soda Pulp

The soda process in addition to its use in the pulping of wood also has been applied to digestion of straw, grass, bamboo, kozo, mitsumata, bagasse, and other fibrous materials. Nearly any kind of wood is used for soda pulp in Japan, the most important factor apparently being availability. Most of the soda pulp produced in Japan is low in strength, poor in color, and nonuniform, and it is consumed in small amounts in a multitude of papers where strength and quality are not important. Such papers include low-grade toilet tissue, boxboards, certain writing papers, and Japanese-style papers, including the handmade variety. Although well prepared soda pulp has special characteristics which make it suitable for use in certain papers, the tendency in Japan appears to be to consume the pulp wherever it can be tolerated, rather than because of its special properties.

During the past eight years, soda pulp was produced chiefly in Japan proper and Formosa, with a small production in Korea. No soda pulp was produced in Hokkaido or in Karafuto. With one exception, all soda mills are located in the central and southern half of Honshu, in Kyushu, and Shikoku. Because of the small and dispersed nature of the industry, no data are available on production prior to 1938. Total production of soda pulp increased from about 3,000 short tons

Table 2

District or prefacture	Company	Mill	Rated annual capacity (short tons)
Hokkaido	Kokusaku Pulp Industrial Co., Ltd.	Asahikawa	61,600
Yamaguchi	Sanyo Rayon Pulp Co. Ltd.	Iwakuni	34,520
Akita	Tohoku Shinko Pulp Co. Ltd.	Akita	28,000
Miyagi	Tohoku Shinko Pulp Co. Ltd.	Ishinomaki	28,000
Toyama	Kokoku Rayon Pulp Co. Ltd.	Toyama	26,880
Miyazaki	Iapan Pulp Industrial Co. Ltd.	Obi	22,400
Niigata	Hokuetsu Paper Mfg. Co. Ltd.	Niigata	20,160
Aichi	Toyo Spinning Co., Ltd.	Inuyama	8,960
		Total	230,520

in 1938 to a high of about 117,000 short tons in 1941. In the latter year, the production was about 11 per cent of the total production of paper pulp. About one-third of the 1941 production was centered in Formosa. Soda pulp mills total about 50; thus, in Japan proper in the highest production year, the average annual production per mill was only about 1,500 short tons. The largest mill has a rated annual capacity of 5,380 short tons.

The production of soda pulp is at a virtual standstill now because of the shortage of caustic soda. The process as practiced in Japan is wasteful of caustic soda, because the sizes of the mills is so small that recovery of chemical is not feasible. However, given sufficient chemical, these mills are able to contribute to relief of the fiber shortage by pulping straw, grass, bamboo, or other materials which normally would not be used by larger pulp mills.

Paper

To an observer familiar with modern western methods of producing paper, the Japanese industry appears to be an incredible blend of the reasonably modern with the very old. Many machines are very small in size and low in production, and even handmade papers seem to be capable of competition with modern machines. This condition is perhaps due in part to the low wage standards of the workers, and, in the case of handmade papers, to a historical emphasis given to the many special papers incapable of production on modern machinery.

The manufacture of handmade papers in Japan is a fascinating subject involving a study of the mode of living and culture of the Orient. While it is true that certain of these papers have a singular and distinctive beauty, their charms have often been exaggerated over the centuries by writers and artists to the point where papers are endowed in terms of attributes usually reserved for humans, such as "masculinity," "dignity," and "sweet temper." Because of the complete dissimilarity of equipment and techniques of manufacture of handmade and machine-made papers, no detailed description of the industry is given in this report. It may surprise persons familiar with the tedious methods of making hand sheets, however, to note that the production of handmade papers in Japan in past years was of the order of 30,000 tons per year.

Because the Japanese produced certain papers peculiar to their culture for hundreds of years before machine papers were known to them, the superposition of "foreign-style" paper in relatively recent years resulted in a confusion of classification of the various papers. Originally it was sufficient to distinguish foreign-style from Japanese-style paper, as the former referred clearly to a wood pulp sheet of doubtful quality, which was machine-made and available in sufficient quantity for consumption by people of moderate means in the form of newspapers, office papers, and wrappings.

As machine-made papers became competitive with the classic handpapers, however, a further subdivision into "machine-made Japanese papers" and "handmade Japanese papers" was necessary. The classification is thus more dependent on the specific use than the origin of the paper. As an example, a groundwood and sulphite machine-made toilet tissue may be "foreign style" if sold in the household roll form, or "Japanese style" if converted to the flat packaged sheets often used by the Japanese. A machine-made paper for writing use with the traditional charcoal and brush may be considered "Japanese style" paper, but the same paper applied to office typewriter use would be clearly "foreign style."

At one time, papers produced from the inner bark of the mulberry were all handmade and thus easily distinguishable from "foreign-style" papers, but certain machine techniques were developed to use these long fibers to produce quality papers, and as an example some of these papers were used in the bombing balloons and in the paper money of Japan. The so-called "foreign-style" papers which constitute most of the total paper tonnage in Japan are made almost entirely from common wood pulps. The types of paper include newsprint, printing, wrapping, coated papers, photographic, bond, ledger, blueprint, drawing, cigarette, glassine, condenser, blotter, bank note, bible paper, toilet tissue, wadding, containers, boards, etc.

The machinery is orthodox, of the fourdrinier, cylinder, Yankee, or combination types. Some of the machines were produced in England, the United States, and Switzerland, and the Japanese-built machines in most cases appear to be copied from imported models. Processing or refining equipment usually consists of ordinary beaters and Jordans, and in some cases Kollergangs.

A large amount of coated or "art" papers was made before the war, but coating materials are not available or are very scarce at present. Coating is usually done on conventional coating equipment apart from the paper machines. Size-tub equipment was common, but no modern equipment for on-machine coating was observed. Supercalenders are common and are used in the production of glassine and other thin papers having a high gloss.

The Japanese excelled in the manufacture of thin special papers such as a hemp paper for use as a silk wrap, high-quality cigarette paper for the tobacco monopoly and export, and kraft condenser paper as thin as 0.0005 inch. Other special high-

Typical bomb damage to Japanese paper mills is illustrated by this view at the Kanzaki mill, Oji Paper Manufacturing Co., Ltd.

quality watermark papers were made for bank note paper for export to China.

Sinee resin for sizing was largely imported before the war, it is now almost completely unavailable, and this is reflected in the poor water resistance of most papers. Papers made from pine sulphite pulp often had adequate water resistance without the use of sizing, presumably due to natural resins in the wood. Little progress was made in the development of new special papers, or combinations of papers and chemicals for war use, although certain papers are used to a limited extent for artificial leathers or are twisted and used for fabrics. Such recent special papers are moisture-vapor barriers or even wet-strengthened papers appear to be almost nonexistent.

Machine paper mills in Japan number about 275. Of a total of about 500 paper machines somewhat over 100 are fourdriniers of the conventional type varying in width from about 42 inches to 180 inches, and about 400 machines are of the cylinder, Yankee, or special types varying in width from about 20 inches to 148 inches, with nearly all of the latter group being less than 100 inches wide. A large portion of the paper mills are clustered about the principal cities. The largest mill by a considerable margin is the newsprint plant of the Oji Paper Manufacturing Company at Tomakomai, Hokkaido. This mill has ten paper machines, seven of which are 142 inches wide. The Tomakomai mill produces nearly all of the newsprint for Japan, the balance being made by the Kushiro, Yatsoshiro, and Sakamoto mills of the Oji Company.

Damage to paper mills due to bomb raids was greater than that suffered by the pulp mills chiefly because of the location of plants. Fire damage to certain mills in the large city areas was great, and this fact, coupled with shortages of coal, pulp, and machine parts, had reduced production to about one-third of prewar. Machine wires and felts, particularly the former, were difficult to obtain immediately after the end of the war. Nearly all of the felts and wires were produced by subsidiaries of the Oji Paper Company. Much of the wire-producing capacity was burned but was quickly repaired in a makeshift fashion.

By-products and Research

A few of the larger sulphite pulp mills utilize their waste liquor for the production of ethyl alcohol. Although much of the alcohol was made in Karafuto mills, by the end of the war new plants were under construction in Japan proper. Modern equipment included continuous fermentation equipment. Sulphite waste liquor was also concentrated in crude wooden tanks or in modern multiple effect evaporators to produce a material for use as a binder for charcoal briquettes, as an adhesive for paper, and as a tannin substitute. For use as adhesives the waste liquor was treated with lime to a *p*H of 4.6 before evaporation to a concentration of about 200 grams per liter. The high percentage of screenings obtained from the sulphite pulping of pines are disposed of chiefly in the production of insulating boards, a common name for which is "Texboard."

Female laborers removing bark from pulpwood logs by hand methods. Sakamote mill, Oji Paper Manufacturing Co., Ltd.

Other related products of perhaps lesser importance include crude rosin from pine stumps which is steam distilled to yield wood rosin and turpentine, the refining of pine root oil for fuel and lubrication, the manufacture of a building brick from coal ashes and lime, and the manufacture of turpentine from sulphite digester vapors.

The most important and most highly developed research on wood products has been in the field of cellulose chemistry as related to the chemical utilization of pulp, particularly for rayon. Principal research efforts related to pulp and paper have been made by the Central Laboratory of the Oji Paper Company, the Institute of Fiber Chemistry at Kyoto Imperial University, Tokyo Imperial University, and other branches of the Imperial universities.

Shortages caused by the war have naturally altered the emphasis of study. Much effort appears to be given to the alleviation of salt and fiber shortages. Experiments observed included the continuous electrolysis of sea water in a mercury cell to obtain caustic soda and chlorine for use in pulping. Caustic solutions up to about 20 per cent concentration can be made by this method. The hydrogen evolved in the electrolysis was being used for experiments on the production of fertilizer from sulphite waste lignin and rice hulls.

Other research efforts were on pulping by the nitric acid method, lignin resins for plastics, sulphite turpentine oil, alcohol produced from artichokes or potatoes, and on pine, beech, and larch for rayon or high-alpha pulps.

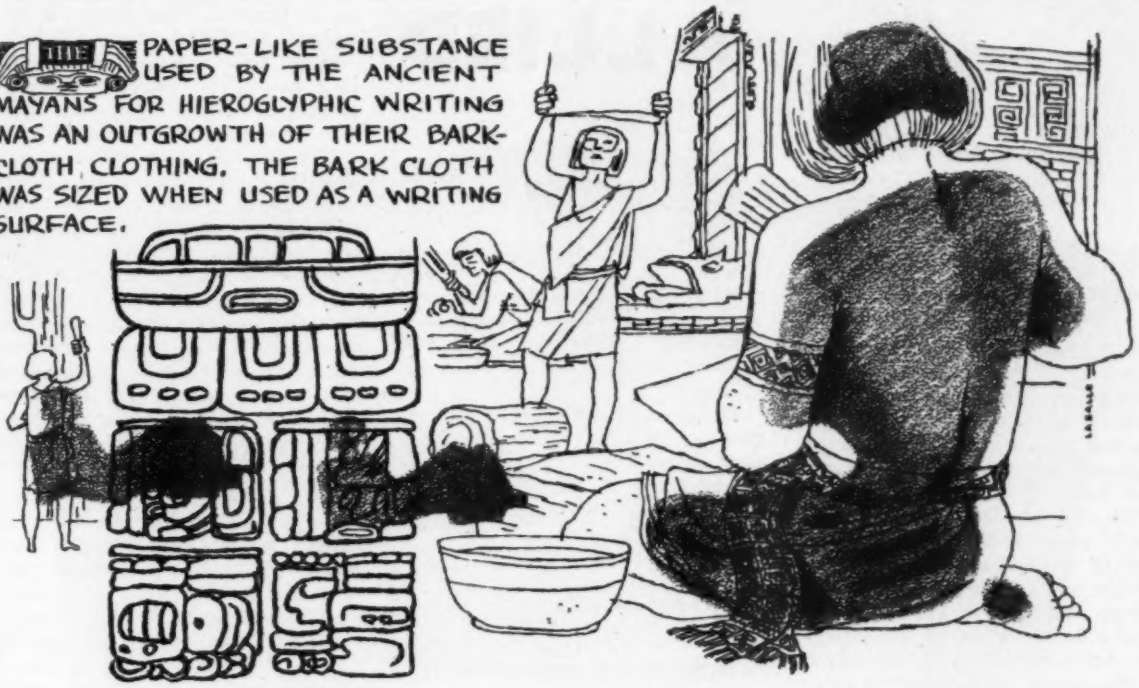
Personnel

The wage and living standards of Japanese mill workers are very low by western standards. Labor-saving equipment, conveniences for employees, and safety devices seem to be at a minimum. Female labor is widely used and in an uncommon number of instances the difficult work such as log barking and the hand loading of railroad cars appears to have been assigned to the girls or women, probably because the wage scale for females is lower.

The take-home pay of a typical worker is a confused and vague mixture of several components of which "salary" may be only about one-quarter of the total. Other compensations include such items as commodity allowance, residence allowance, special allowance, service allowance, and no absence bonus. In addition, small amounts of fish and rice may be given. A common convenience for employees is the traditional community hot bath which is built for employees at principal mills. The water for this bath is maintained at a high temperature by the use of mill process steam.

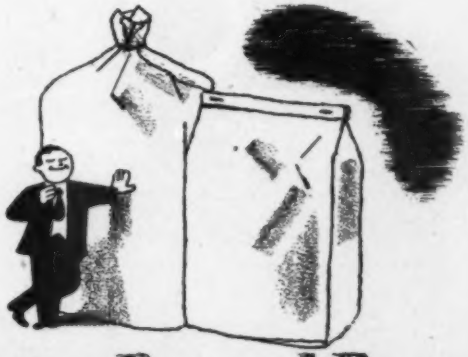
Paper SKETCHES . . . . . .

THE PAPER-LIKE SUBSTANCE USED BY THE ANCIENT MAYANS FOR HIEROGLYPHIC WRITING WAS AN OUTGROWTH OF THEIR BARK-CLOTH CLOTHING. THE BARK CLOTH WAS SIZED WHEN USED AS A WRITING SURFACE.



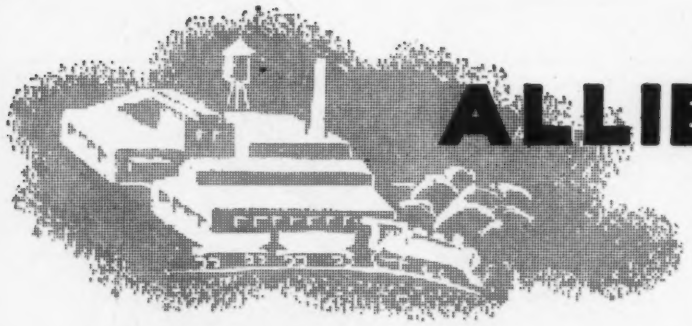
SO SEVERE AND ENDURING WAS THE DEFLATION FOLLOWING THE WAR OF 1812, THAT THE NUMBER OF PAPER MILL HANDS IN PENNSYLVANIA AND DELAWARE DECLINED FROM 950 IN 1816 TO 175 IN 1819, OBLIGING THE SOCIETY OF PAPERMAKERS OF THOSE STATES TO PETITION CONGRESS FOR RELIEF.

The SMITH PAPER COMPANY OF LEE, MASSACHUSETTS, FIRST IN THE UNITED STATES TO USE DOMESTIC GROUNDWOOD PULP FOR PAPERMAKING (MARCH, 1867), KEPT THIS FACT A SECRET FOR MORE THAN A YEAR!



Union Bag and Paper

WET STRENGTH PAPER BAGS, MADE OF TWO OR THREE PLYS OF KRAFT PAPER, FOR THE PREPACKAGING OF POTATOES AT SHIPPING POINT IN 10, 15 AND 50-POUND LOTS, IS ONE OF THE NEWER PACKAGING DEVELOPMENTS IN THE PRODUCE FIELD.



LOCKPORT FELT COMPANY TURNS OUT LARGEST FELT

A leading paperboard manufacturer in the Middle West will soon be running on one of the largest paper machines in the country, the largest felt ever turned out of the plant of Lockport Felt Company, Newfane, New York.

This felt is 242 feet long by 18 feet, 2 inches wide. It required the wool of approximately 230 sheep to provide the 1,400 pounds that went into its making; or sufficient wool to make 273 suits of clothes or 145 regular size bed blankets. The length of the yarn in the felt is 335 miles, approximately the air-line distance from the Lee Airport in Lockport to LaGuardia Field.

The making and weighing-in of this interesting and exceptional felt coincided with the 42nd anniversary of William H. Lee's connection with the Lockport Felt Company. When he joined the firm in 1905, the personnel numbered 35, and the equipment consisted of one set of 48-inch cards and three looms. Today, the mill has 190 workers, six sets of 60-inch cards and 27 looms.

During the war, the Lockport plant turned out blankets for the Navy and cloth lining for boots worn by the Armed Forces in the Aleutians, Iceland, and other sub-zero climates, but the company's efforts are again devoted to the manufacture of papermakers' felts—its specialty since the company was founded in 1891.

◆

WOOD PULP MOVEMENT MAY PASS THROUGH GREAT LAKES

Among the interests concerned with importing wood pulp from Scandinavia, negotiations are now going on which point to the possible chartering of cargoes into the Great Lakes during the coming season.

These steamship lines expect to be operating about eight of the small ocean-lake type vessels from Scandinavian ports into the Lakes to Chicago and other ports. After partial unloading at Montreal, these vessels are able to continue the trip down the locks into the Lakes carrying about 1,300 long tons. This mode of shipment promises substantial savings to middle-western consumers of wood pulp.

The situation on transshipping possibilities out of Montreal is not yet clear due to the delay in the Canadian Government's decision on allocation of lake bottoms for the eastbound grain movement. It is hoped, however, that some space will be available on these canal ships for the westbound movement of wood pulp. Even with the extra cost of unloading at Montreal, this service would still show savings on freight for most of the receivers in the Midwest as against the present high all-rail costs from Atlantic seaboard ports.

◆

▶▶▶ THE ANNUAL SALES meeting of H. K. Porter Company, Inc., was held the first week of March at the William Penn Hotel, Pittsburgh. More than fifty men who attended the meeting heard W. W. Calihan, director of sales for the corporation, report that the year 1946 surpassed any year in the history of the company from a sales standpoint, including the war years.

◆

▶▶▶ A NEW SALES OFFICE has been opened at 1500 Walnut Street in Philadelphia by the American Brake Shoe Company. This office will be occupied jointly by representatives of four divisions of the company. James J. Nelson will represent the National Bearing Division; Thomas N. Mitchell, district manager, the Kellogg Division; L. John Harwood, the Electro-Alloys Division; and George E. Anne, the Brake Shoe & Castings Division.

◆

EXPANSION AT STALEY PLANT WILL INCREASE CAPACITY

A large contract has been awarded the H. K. Ferguson Company by the A. E. Staley Manufacturing Company, for modernization and expansion of its corn refinery plant at Decatur, Illinois.

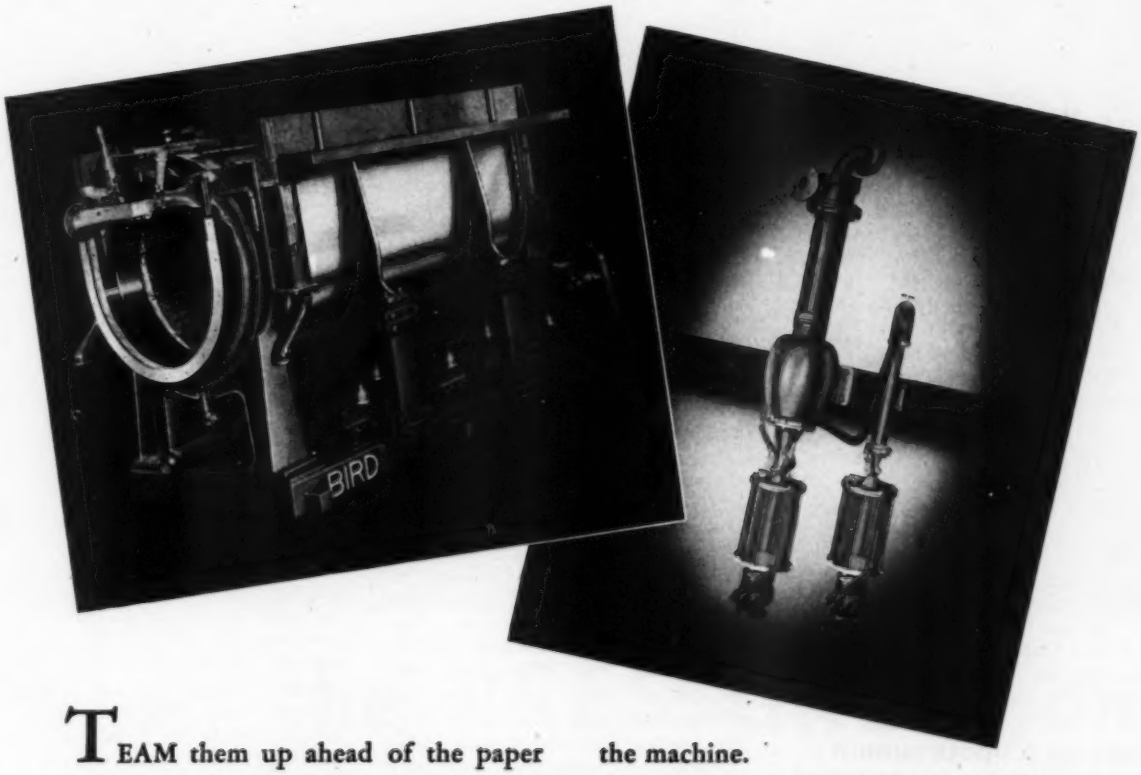
The major portion of the work will be the creation of additional processing facilities. Corn grind capacity of the plant will be increased from its present level of 50,000 bushels daily to 75,000 bushels.

Most of the increased capacity, according to Staley officials, will be used in the manufacture of syrup. The remainder of the additional capacity will be used in making special starches for use in the textile, paper, and other industries.

Largest felt ever turned out by Lockport Felt Company

The BIRD SCREEN *and the* BIRD DIRTEC

go together like ham and eggs



TEAM them up ahead of the paper machine and you get an unbeatable dirt removal combination.

Big, modern Bird Screens give you the capacity to permit efficient screening action with fine cut plates. They get the dirt that differs in *size* from the fibres. They deliver the fibres well combed out and individualized, free of lumps, strings and slime — ready to make uniformly good paper to the maximum capacity of the machine.

Bird Dirtecs get the dirt that differs in *weight* from the fibres and detour this dirt neatly and completely out of the system in the simplest, most effective, most economical way.

Dirtecs are also ideal tailings units for Bird Screens. They permit rapid circulation of stock through the Screens with virtually no fibre loss. Maximum dirt removal efficiency is thus assured.

Ask us to show you how you can make cleaner paper and more of it at lower cost

BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS

GEO. W. PORTER LEAVES M AND O—ORGANIZES NEW SUPPLY COMPANY

A new organization which will function as sales representative in the industrial field has been established with offices at 517 Northwestern Bank Building, Minneapolis, under the name of Technical Supply Company with offices at 517 Northwestern Bank Building, Minneapolis.

This new company is headed by George W. Porter, former research chemist with the Minnesota and Ontario Paper Company. Mr. Porter is a member of several national bodies including the American Chemical Society and the Technical Association of the Pulp and Paper Industry. He is a member of the bar of the Supreme Court of the United States and several other federal courts.

Mr. Porter states that he will make a later announcement regarding other personnel of the new company.

◆

▶▶▶ SINCE THEIR REMOVAL from offices in Boston two years ago, Frederic C. Clark Associates, consulting engineers, have found it necessary to add to his staff and to secure larger quarters. Their new offices will be at 50 Church Street, New York City. A staff addition to the organization as of last October, is Henry J. Perry, one who has had wide experience in the manufacture of pulp and paper.

◆

FORESTRY SCHOOLS SHOULD EXPECT HEAVY ENROLLMENTS

Looking ahead 40 years in forestry, Dr. Hardy L. Shirley, assistant dean of The New York State College of Forestry, Syracuse University, believes that the heavy enrollments in forestry schools will continue and during the next two or three years may increase, and that the demands of the future for well-trained graduates will justify larger enrollments.

All phases of the profession are included in Dr. Shirley's detailed estimates which total 120,000 forestry jobs in 40 years. He says, "Even if our schools turn out 3000 men each year it will take more than 40 years to build up such a personnel and by that time the replacement rate would be 4000 men annually."

Last year there were 7,010 undergraduates in the forestry schools of the United States. The highest previous enrollment was 6,067 undergraduates. But if freshmen classes do not diminish we will have in 1949 close to 13,000 forestry students in our schools, and an annual graduating class of approximately 2,400.

Dr. Shirley points to the possible expansion in undeveloped fields and the fact that we have a long way to go before the United States approaches the degree of intensity of forest management that now exists throughout western Europe.

◆

▶▶▶ THE MAIN OFFICE and plant of Liquid Conditioning Corporation has been moved to Linden, New Jersey, to take care of its expanding business. The new centralized facilities of the company include enlarged departments for designing, testing, research, assembly, and warehousing. The location is at 114 East Price Street, Linden, New Jersey.

◆

WESTINGHOUSE TO EXPAND FACILITIES AT BUFFALO

Manufacturing facilities at the Buffalo (N. Y.) plant of Westinghouse Electric Corporation are to be expanded, according to a recent announcement.

The new operation, formerly a part of the Switchgear and Control Division at East Pittsburgh, will be known as the Industrial Control Division. To facilitate the transfer, L. R. Ludwig, manager of the Motor Division, has been assigned responsibility for this operation in its present location. Operations at Buffalo eventually will include motor, industrial control, copper wire and welding activities, and will be known as the Buffalo Divisions, rather than the Buffalo Motor Division. An additional 1,500 persons will be added to the payrolls at Buffalo when operations are fully under way.

◆

▶▶▶ THE VAST CONSTRUCTION program of the Calco Chemical Division, American Cyanamid Company, is rapidly taking shape at Willow Island, West Virginia, just north of Parkersburg. Melamine and inorganic pigments will be centered at the Willow Island works.

◆

DIAMOND ALKALI WAREHOUSE IN CHICAGO IS COMPLETED

A new development in chemical distribution is being accomplished with the completion of a specially designed warehouse in Chicago by Diamond Alkali Company for use by its Benner Chemical Sales Division.

The structure, 150 feet wide and 250 feet long, is designed to provide for economical storage and handling of products such as soda ash, caustic soda, bicarbonate of soda, cylinder chlorine, and Alkali specialties. It is one of the largest distribution terminals heretofore built for the heavy chemical industry. A specially designed vault provides storage for chlorine in cylinders in accordance with the most up-to-date safety precautions.

Modern mechanical methods will feature the handling of large drums and bags of chemicals so as to minimize costs and protect the individual workmen.

◆

BABCOCK & WILCOX NOW FABRICATING 5 UNIQUE WOOD PULP DIGESTERS

Five rotary digesters for the manufacture of wood pulp, each weighing 77,000 pounds and coated internally with a chromium alloy liner, will be built by The Babcock & Wilcox Company at its plant in Barberton, Ohio. These are the first alloy clad digesters the company has furnished for the sulphate paper industry and they are being fabricated for the Camas (Oregon) mill of the Crown Zellerbach Corporation, of San Francisco. A sixth, slightly smaller, digester is also being built for the same company.

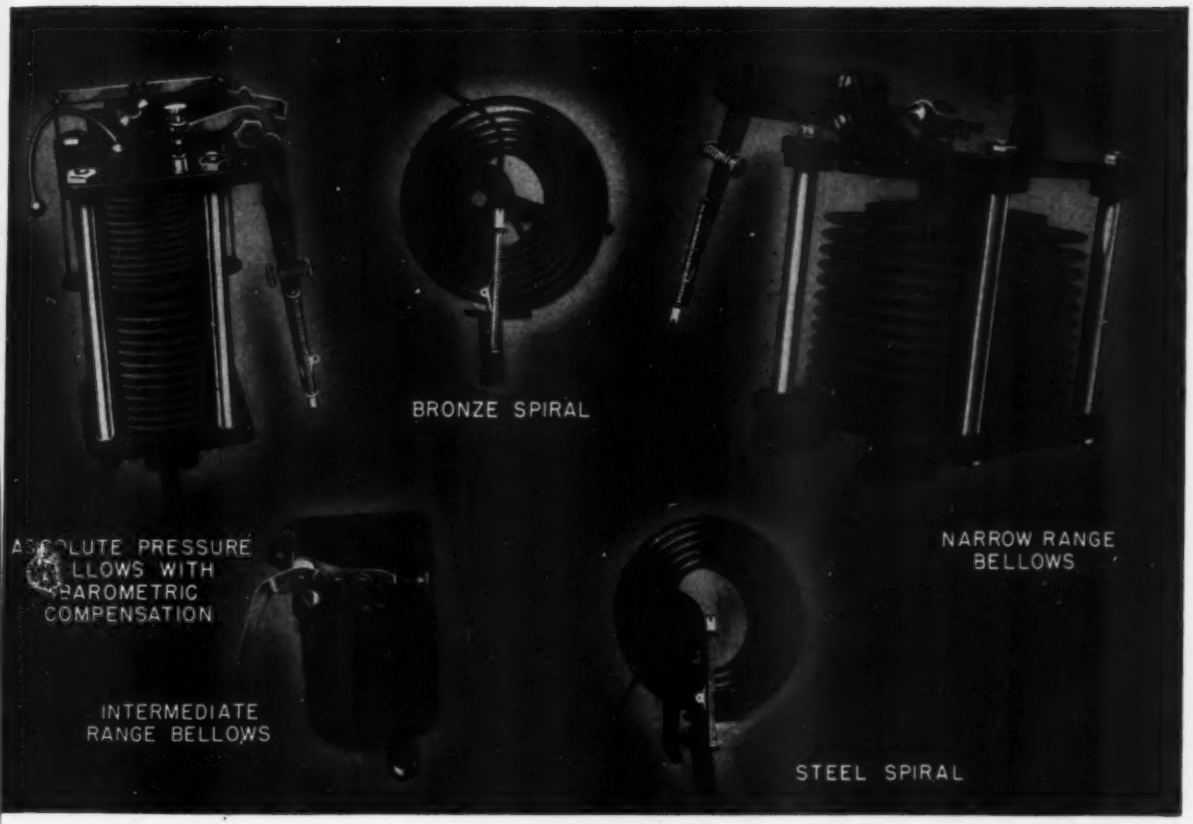
Two features, exclusive with Babcock & Wilcox, are embodied in the construction of these vessels. One is the process by which the alloy lining is resistance-welded to the base metal; the other is the design, patented by the company, covering the construction of a heavy center girth section extending around the entire circumference of the vessels. The trunnions are attached to this girth section, permitting rotation of the digesters.

The digesters have an inside diameter of 10 feet 3 inches and are 30 feet long over the end flanges. Each end is fitted with a cone, 1 9/16 inches thick. The shell is made of 1⅛ inch steel plate with a heavy reinforced section around the middle 3¼ inches thick.

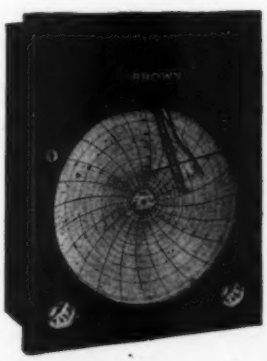
These digesters are equipped with trunnions so that they may be rotated end over end approximately one to two revolutions per minute. This means that the digesters, with their heavy contents, will each have a total weight of approximately 100 tons and must be supported at two points.

Because of the high loading on the shell, the Babcock & Wilcox Company has drawn from its experience in designing the reinforcement for the Boulder Dam penstock section, applying a similar method to reinforcing these digesters.

The original design resulted in a patent being issued to the company to cover the construction. It consists of a heavy center girth section extending around the entire circumference and to which the trunnions are attached by welding. This section



When the PRESSURE'S on . . . elements count



Brown Air-Operated Pressure Controller

Under actual paper mill operating conditions, the real value of this *complete line* of pressure elements proves itself in performance.

Unquestionably, the most important single part of any pressure gauge is the actuating element. Theoretically, perhaps, one form of element could be spread or adjusted over a wide variety of ranges, but not without sacrificing the performance characteristics for which Brown Pressure Gauges are known.

Each form of these actuating elements is precision engineered for specific ranges to give ample positioning power with an absolute minimum of hysteresis effect or sticking. This overcomes the inconsistency of many gauges which read high under conditions of decreasing pressure and low under conditions of increasing pressure.

Carried over to control models, these precision engineered actuating elements mean closer, more sensitive control with less cycling to upset process stability. As controllers they are available with the well-known Brown Air-O-Line control unit.

Write for Catalogs 6708 and 8904. THE BROWN INSTRUMENT COMPANY, a division of Minneapolis-Honeywell Regulator Co., 4489 Wayne Avenue, Philadelphia 44, Pa. Offices in all principal cities.

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STOCKHOLM, SWEDEN

BROWN PRESSURE GAUGES

S A F E T Y

SPECIAL SAFETY SERIES OF MILL VISITATIONS OFF TO A GOOD START

A new movement in safety study is taking shape among member mills of the Paper and Pulp Section of the National Safety Council. Under this plan, safety workers within certain regions will gather for timely discussions of their particular problems. A special feature of the meetings is, of course, mill visitation.

The first in this series of visitations was held February 28 at Thilmany Pulp & Paper Company, Kaukauna, Wisconsin. About 36 safety workers attended from mills located at the following towns in Wisconsin: Appleton, Green Bay, Wisconsin Rapids, Cornell, Milwaukee, Kimberly, Neenah, Menasha, Mosinee, Port Edwards, Tomahawk, Merrill, and Stevens Point.

Another visitation conference took place March 28 at the Chillicothe (Ohio) plant of The Mead Corporation. Attending this meeting were twenty safety and personnel representatives of Ohio paper mills from the following towns: Canton, Chillicothe, Circleville, Franklin, Gypsum, Hamilton, Middletown, Rittman, and West Carrollton. Attending this meeting was E. P. Marconi, safety engineer of the Paper and Pulp Section of the National Safety Council, Chicago. An interesting program had been prepared for the first part of the forenoon session. The rest of the morning was devoted to an inspection tour of the plant, after which the delegates were entertained at a special luncheon. The afternoon program featured two short films, "Trees to Tribune" and "Plan for Safety."

◆

B. C. PULP AND PAPER SAFETY ASSOCIATION MEETS IN THREE-DAY CONFERENCE

A three-day conference was held recently by the British Columbia Pulp and Paper Industry Safety Association in New Westminister, British Columbia. This association was formed in February, 1946, to promote the reduction of accidents in the industry throughout the province. Much porgress toward its main objective has been made by the association under the chairmanship of Louis Pumphrey, assistant superintendent of Westminster Paper Company.

At the recent meeting, C. Craig, superintendent of Sidney Rooding Company, Victoria, addressed the meeting, stating that his company had recognized the association's safety program. A special guest of the conference was H. L. Hansen, international representative of the Brotherhood of Pulp, Sulphate and Paper Mill Workers.

Also present at the meeting was J. H. McLean, safety inspector of the Workmen's Compensation Board, who presented the association with a general outline on present working conditions compared with those of several years ago.

◆

▶▶▶ A SAFE DRIVING CONTEST for truck operators in the state of Wisconsin is conducted annually by the Wisconsin Motor Vehicle Department. The Badger Paper Mills, Peshtigo, is one of eleven firms which finished four consecutive years (at the end of 1946) without accidents in their truck fleet.

◆

SAFETY SCORES

▶▶▶ THE PAPER INDUSTRY Safety Contest for 1946-1947 has finished the seventh month. The contesting mills enter the second half with sixteen maintaining a perfect record. The Remanufacturing Division shows the best reduction in rates—17 per cent. The frequency rate of 17.55 for all contestants is 11 per cent lower than the rate for the comparable period of last year.

Division I—Pulp and Paper Mills

Group A—
(None.)

Group B
P. H. Glatfelter Co., Spring Grove, Pa.

Group C
Strathmore Paper Co. (West Springfield Mills), West Springfield, Mass.

Certain-teed Products Corp., E. St. Louis, Ill.

Certain-teed Products Corp., York, Pa.

Group D
Strathmore Paper Co. (Woronoco Mill No. 1), West Springfield, Mass.

E. I. du Pont de Nemours & Co., Inc. (Russell Plant), Huntington, Mass.

International Paper Co., Livermore Falls, Maine

Container Corp. of America, Wilmington, Del.

International Paper Co., Riley, Maine.

Division II—Paper & Board Remanufacturing

Group A—
(None.)

Group B
Old Colony Envelope Co., Westfield, Mass.

Kimberly-Clark Corp., Memphis, Tenn.

Bird & Son, Inc. (Roofing Plant), Shreveport, La.

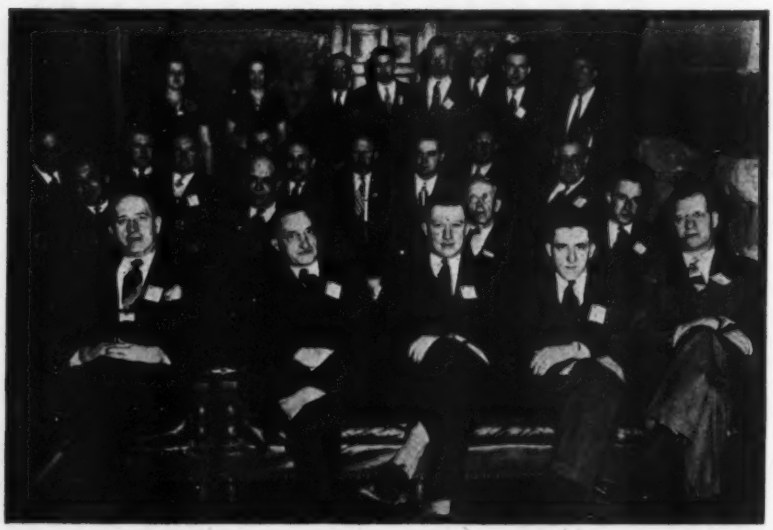
Fort Wayne Corrugated Paper Co. (Rochester Div.), Rochester, N. Y.

The Flintkote Co. (Hollywood Paper Box Div.), Los Angeles, Cal.

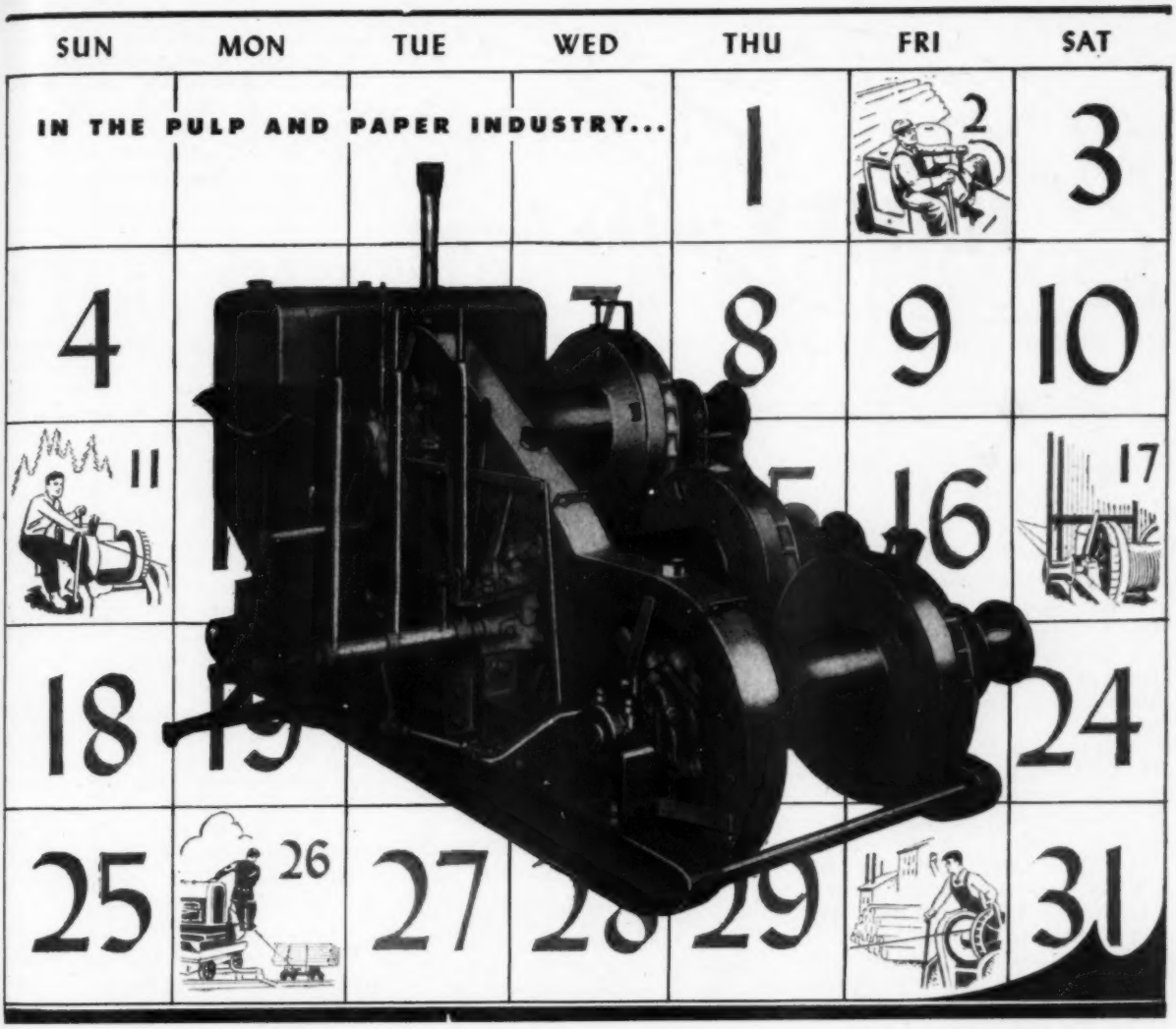
Thilmany Pulp & Paper Co. (Bag Mill), Kaukauna, Wis.

Gaylord Container Corp., Milwaukee, Wis.

Bay West Paper Co., Green Bay, Wis.



Safety visitation group at The Mead Corporation, Chillicothe, Ohio—(left to right) First Row: George W. Bryan, Charles Walter, A. H. Oglesby, Robert Wilson, Ted Hieronymus. Second Row: Edward Lum, A. E. Topmiller, George Uhlinbrock, L. C. Branham. Third Row: Don Hunter, Frank M. Webb, E. P. Marconi, H. L. Baughman, Fred M. Singer. Fourth Row: George W. Harper, Thomas D. Young, Roland W. Richardson, O. C. Bazler. Standing: Betty Delong, Catherine Andrews, Ernest Augustus, Francis H. Wagner, Oather Noble, Dr. W. C. Breth, Ralph Myers, Grover G. Goshorn



There's never an idle day for... **American General Purpose Hoists**

● In today's big job of converting standing timber into pulp and paper, rugged and versatile AMERICAN General Purpose Hoists are helping every step of the way . . . every hour of every day. Helping in the forest, they provide smooth, fast performance in car loading work . . . handle dragline jobs . . . rake down stockpiles . . . and serve in many other ways. At the mills they handle scores of hauling, hoisting, elevating jobs. AMERICAN General Purpose Hoists are built in five sizes, for 2500 to 10,000 lb. (single line) loads. They're compact, powerful, dependable, portable. Available with single, double or triple drums. Ask your distributor for specific, profit-making facts!

Plant No. 2
So. Kearny, New Jersey

Sales Offices:
Chicago • Pittsburgh
New York • New Orleans
San Francisco

American Hoist
and DERRICK COMPANY

St. Paul 1, Minnesota

946

NAMES in the News

Nelson Douglas Clark Smith Spaulding WHITE CLEVELAND Arthur Wolf Morris Simpson Kraft Bryan Temple

PERSONALS

C-Z ANNOUNCES NUMBER OF MANAGERIAL CHANGES

New changes in the management staff of Crown Zellerbach Corporation was announced by J. D. Zellerbach, president of the organization, at a recent meeting in Camas, Washington.

Clarence Bruner, resident manager of the West Linn (Oregon) mill, was named management consultant for the whole corporation, to be succeeded by Pete Sinclair.

E. W. Erickson, Port Townsend (Wash.), resident manager, is retiring and will be loaned to the Fibreboard Products Company where he will act as supervisor and consultant during the start of that company's new mill at East Antioch, California.

Leo Ziel and Norman Lewthwaite will succeed Mr. Erickson as resident manager and assistant resident manager, respectively.

R. A. Dupuis, resident manager of the Port Angeles (Wash.) newsprint mill, will become assistant resident manager at West Linn and he will be succeeded by Malcolm Otis, resident manager at Lebanon, Oregon.

G. H. Galloway, assistant paper mill superintendent at Camas, will be acting resident manager at Lebanon.

C. A. Grondona has been transferred to the Camas plant as assistant resident manager, and R. O. Hunt has been named assistant manager of manufacturing for C-Z at San Francisco.

◆

▶▶▶ The recent appointment of *Edward L. Patton* as consultant on glass advertising of the Pittsburgh Glass Company has been announced. Since 1934, when the department was created, Mr. Patton has been manager of glass advertising and sales promotion. Succeeding Mr. Patton as manager of the department is *Robert Wardrop*, who has served as assistant manager since his separation from the Army last year.

◆

▶▶▶ The new Pacific coast district manager for the Falk Corporation, Milwaukee, is *Ken O. Hood*. Associated with Falk for more than ten years, Mr. Hood was on the sales staff in Detroit from 1936 to 1943 and most recently was manager of the Cincinnati district. With headquarters in Los Angeles, he will direct all sales in the western states.

◆

ALFRED YARDLEY SUCCEEDS FATHER AS PRESIDENT OF JENKINS BROTHERS

Alfred J. Yardley has been elected president of Jenkins Brothers, manufacturers of valves, succeeding his father, Farnham Yardley, who becomes chairman of the board, after serving as president for the past 30 years. A great grandson of Nathaniel Jenkins, the founder, he is the fourth president of the organization.

The company also has announced the election of James L. Dunn, vice president in charge of industrial relations, and C. C. Chamberlain, general sales manager, to the board of directors.

Alfred J. Yardley

◆

▶▶▶ A new addition to the U. S. Stoneware Company's Process Equipment Division's sales engineer force is *Sidney A. Lewis*. Mr. Lewis, a former captain in the U. S. Army Chemical Warfare Service, is an authority on electroplating on plastics, and is a member of the American Chemical Society, the Electro-chemical Society, and the American Electroplaters' Society. His headquarters will be in the New York offices of the company.

◆

▶▶▶ A well-known figure in the paper, sugar and chemistry fields, *James P. Rubush*, has resigned as vice president and sales manager of the Goslin - Birmingham Manufacturing Company, Birmingham. He was formerly the head of the company's New York office. Mr. Rubush will devote himself to other interests.

◆

▶▶▶ Two appointments announced by the National Bearing Division of the American Brake Shoe Company are *Emmett A. Williams* as vice president in charge of operations, and *I. E. Cox* as vice president in charge of engineering. Mr. Williams' first job with National Bearing was chief clerk of the Meadville plant.

◆

▶▶▶ A recent appointment at the Hopewell (Va.) cellulose products plant of Hercules Powder Company is *Frederick J. Bouchard*, production superintendent. He was formerly supervisor of cellulose acetate operations at the company's Parlin, New Jersey, plant. The establishment of the new position has been made necessary by the growth of Cellulose Product Department operations at Hopewell.

◆

▶▶▶ The appointment of *George F. Heath* as district sales representative of their St. Louis office has been announced by The Cleveland Worm & Gear Company and The Farval Corporation, Cleveland, Ohio.

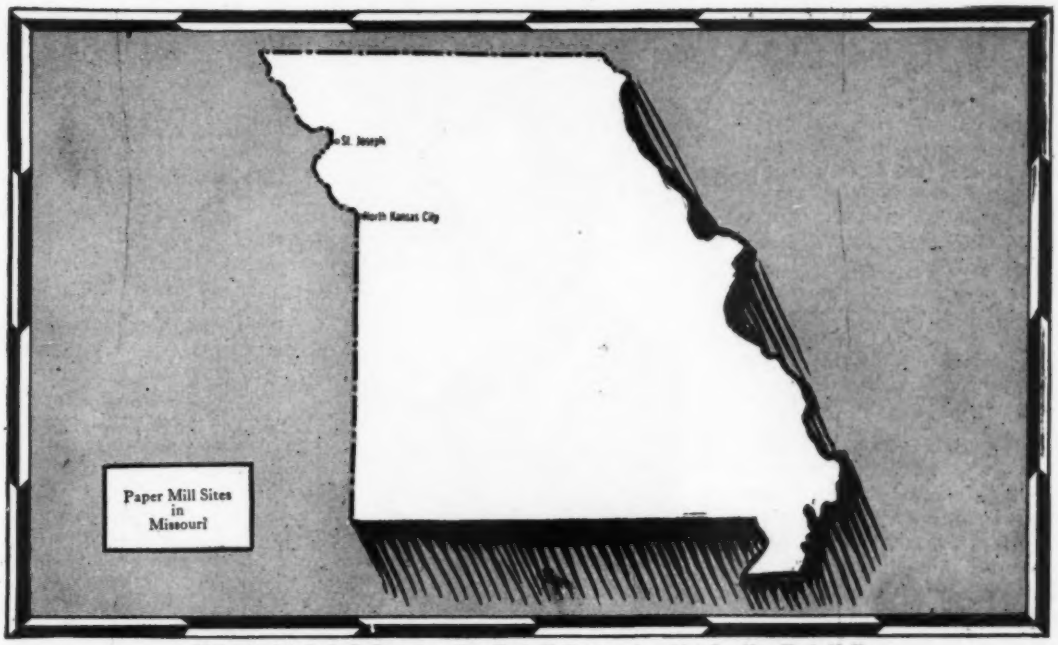
◆

▶▶▶ Appointed to succeed *George L. Green* as manager of the Chicago office of the H. K. Porter Company, Inc., is *Roland E. Nelson*, who for the past year has been sales engineer serving the company's St. Louis territory. He will be located at the company's office, 332 South Michigan Boulevard, Chicago. Mr. Green has been transferred to Pittsburgh, where he is in charge of process engineering.

Draper's

ATLAS OF AMERICAN PAPERMAKING

No. 28 PUBLISHED BY DRAPER BROTHERS COMPANY • CANTON, MASSACHUSETTS



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HIGH LIGHTS: Missouri, the "Show Me" State, once a large producer of lumber, laths and shingles, with considerable coal deposits and clay resources, has possibly more miles of navigable rivers than any other State in the Union. It is still waiting to be shown whether papermaking could be pursued there on a large scale.

At present it has only two paper mills. One makes news lined and manila chip for manufacture of gypsum wallboard and plasterboard, bleached manila lined, solid manilas, test liners and shirt boards. The other manufactures deadening and saturating roofing felt. The total rated daily capacity is listed as only 145 tons.

Geographically the central commonwealth of the United States, Missouri's largest city, St. Louis, is one of the most important paper distributing centers of the country, and Kansas City is another paper jobbing market of importance.

Draper Felts for Efficiency

DRAPER BROTHERS COMPANY

Woolen Manufacturers Since 1856

Canton, Massachusetts

RALPH E. BRIGGS, Sales Manager

BRADFORD WEST, PITTSFIELD, MASS.
WILLIAM N. CONNOR, Jr., CANTON, MASS.
L. H. BREYFOGLE, KALAMAZOO, MICH.
L. L. GRIFFITHS, Jr., KALAMAZOO, MICH.

CENTRAL PAPER COMPANY REORGANIZES SALES STAFF

For better service to the industry, Central Paper Company, Muskegon, Michigan, announces the reorganization of its sales staff. Under the direction of E. W. Pitt, director of sales, there will be three separate units: Sales Supervision, Customers' Service, and Product Development.

Sales Supervision will be headed by D. H. Strickland, who will direct all salesmen, sales representatives, and district sales offices.

Customers' Service will be supervised by Don DeGlopper. He will act as liaison between sales and production, order scheduling, and shipping and routing of the completed order.

Product Development, under Gavin H. Mullen, will take care of technical details on customers' inquiries, development of new products and applications, sample handling, promotional details, and market research.

Arthur Proudfoot has been appointed West coast sales representative, with offices in Los Angeles.

Lambert Van Roy, technical director, has resigned to become head of the Palisades Construction Company, of which he is the founder.

◆

▶▶▶ The newly opened Michigan Alkali Division office of Wyandotte Chemicals has for its manager *Martin J. Conway.* For over 20 years Mr. Conway has been a Michigan Alkali representative in the New York and Pennsylvania territories. He will occupy offices located with the J. B. Ford Division in the Henry W. Oliver Building in Pittsburgh, according to Bert Cremers, vice president in charge of Michigan Alkali sales.

◆

▶▶▶ New manager of Los Angeles branch, Fairbanks, Morse & Company (Chicago) is John A. Cuneo, who has had a varied experience with the company. He succeeds *Harry W. Brown,* who has retired. Mr. Cuneo has traveled widely for F-M, and has handled managerial assignments in Cuba and Mexico.

◆

▶▶▶ Chief research and design engineer for the ECO Engineering Company, Newark, New Jersey, will be *Ralph E. Gordinier.* In his new duties, Mr. Gordinier will work on product development and adaptation. Previous to joining the ECO organization, he was associated with Special Engineering, Incorporated, as assistant chief engineer, with the Buick Division of General Motors Corporation, as mechanical engineer, and with the Ford Motor Company, as machine designer.

▶▶▶ Recent appointments announced by Monsanto Chemical Company in its Merrimac Division at Everett, Massachusetts, are: *Dr. Frederic L. Matthews,* associate director of research; *Harry W. Faust,* co-ordinator of petroleum additives in the Organic Chemicals Division; and *Dr. J. F. Palmer,* research chemist in the petroleum chemical research group. All three have been with Monsanto for several years.

◆

▶▶▶ Former district manager for the San Francisco territory of the Harnischfeger Corporation, *Ralph D. Holcomb* has been appointed general

Ralph Holcomb

sales manager of the company in Milwaukee. With 18 years of experience with the organization, he will direct the sales of all P&H products.

◆

▶▶▶ The Municipal Advertising Board of Pensacola, Florida, has accepted the resigination of *General Sanderford Jarman* as its manager. He has resigned to become executive vice president of the Alabama Pulp and Paper Company.

◆

▶▶▶ Two new appointments have been announced by Hollingsworth & Whitney Company, Boston. *Ralph B. Case* has become New York sales manager, and T. K. Davis is Boston sales manager. These appointments became effective March 1.

◆

▶▶▶ The honorary degree of Doctor of Science has been conferred upon *Charles S. Redding,* president of Leeds & Northrup Company, by the University of Pennsylvania. The degree was presented by Dr. George William McClelland, president of the university, at the midwinter commencement exercises. Mr. Redding is a graduate of the University of Pennsylvania, and served as a member of the faculty for two years. He has been president of Leeds & Northrup since 1939.

◆

▶▶▶ At the annual meeting of the Rockwell Manufacturing Company, Pittsburgh, *W. F. Rockwell, Jr.* was elected president by the board of directors. Colonel Rockwell, who has been both president and board chairman, will retain the office of chairman of the board.

NECROLOGY

▶▶▶ The presidency and ownership of the Kelley Paper Corporation, Bellows Falls, Vermont, was assumed by *Mrs. Madeline Kelley* upon the death of her husband in 1935. She headed the management of the company until the mill was sold to the Green Mountain Paper Company in 1945. Mrs. Kelley passed away March 7 in Burlington, Vermont.

◆

▶▶▶ Retired manager of the bag division of the International Paper Company, *Julius L. Stille,* passed away March 9 in St. Petersburg, Florida. He formerly resided in Larchmont, New York, but moved to St. Petersburg five years ago.

◆

▶▶▶ While on a business trip to South America in February, *Eric C. Gyllensvard,* export and New York office manager of Farrell-Birmingham Company, Inc., was fatally injured by a bolt of lighting while in Sao Paulo, Brazil. He first became associated with the F-B organization in August, 1944. Mr. Gyllensvard was born in Sweden, educated in Switzerland and England. He had held a number of important foreign posts, and prior to joining F-B Company, he was export manager for Sullivan Machine Company.

◆

▶▶▶ *Charles S. Rowe,* sales manager of the fine chemicals division of the Du Pont Company's Organic Chemicals Department, passed away March 1 at Wilmington. Mr. Rowe joined the company in 1919 and had been in his sales post since 1943.

Heavy rolls of soft asbestos in a California plant are taken to and from storage with this Cleveland Tramrail three-runway crane and motor-operated roll grab. The operator manipulates both crane and grab without leaving his cab.

CUTS ROLL HANDLING TIME

Because one operator in the cab of a Cleveland Tramrail Crane can handle rolls in and out of storage without any floor assistants, handling time per roll is cut greatly.

But that is not all! Costly roll damage due to crushed edges, cuts, tears, etc., is reduced. Storage capacity is increased by elimination of usual aisle space. Rolls can be piled far higher.

Regardless of the size of your plant, you should look into the possibilities of a Cleveland Tramrail System now.

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THE CLEVELAND CRANE & ENGINEERING CO.
7003 East 287th Street, WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

REPAIRS SPEEDED

DOWNTIME REDUCED

COSTS CUT . . .

by LUNKENHEIMER

Interchangeable Parts

Maintenance men find their job made easier and operating efficiency stepped up by Lunkenheimer interchangeability of parts.

In servicing the Bronze "Renewo" and Iron Body "Ferrenewo" Valves — both regular and plug types — only *one stock of parts* is required. *All* parts (except bodies and bonnet rings) are exactly the same and fit each other perfectly.

For example—if you need a stem, disc, or seat ring for the "RENEWO", you can use the corresponding part of the "FERRENEWO", and vice versa.

Repairs are more quickly and easily made, ordering and handling are simplified. The result: Lower maintenance cost and low ultimate valve cost.

Lunkenheimer part-interchangeability is fully illustrated and described in Circular No. 567. Ask your Lunkenheimer Distributor for a copy, or write direct.

BRONZE
200 lb. S. P.
"RENEWO"

IRON BODY
150 lb. S. P.
"FERRENEWO"

VALVE MAINTENANCE SIMPLIFIED

There are fewer parts to be carried, repairs are more quickly and easily made. The labor, time, and expense of valve maintenance is cut down—'way down!

SEE YOUR LUNKENHEIMER DISTRIBUTOR!

Lunkenheimer Distributors are located in all industrial centers. There is one near you—have him demonstrate with actual samples the interchangeability of parts in "RENEWO" and "FERRENEWO" Valves. It's a big time and money saver for any plant!

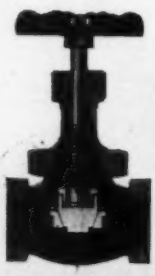
• SAVE THIS WAY, TOO! •

For severe throttling service, a regular type can be converted into a plug type, by simply changing the seat and disc, without taking the valve out of the line.

Thus it's not necessary to buy a whole new valve—just a matched set of plug type seat and disc which interchange perfectly in corresponding patterns and sizes in a range of pressures from 150 to 350 lb. S. P.

Lunkenheimer simplicity of design, minimum number of parts, and fine precision workmanship make this and other outstanding economies possible.

Fig. 16-P
Bronze Plug Type
"RENEWO"



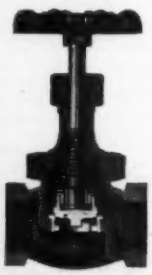
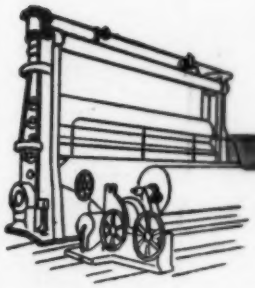
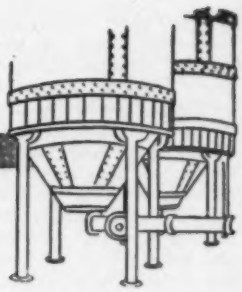


Fig. 16
Bronze Regular
"RENEWO"

THE LUNKENHEIMER CO., Cincinnati 14, Ohio
(OFFICES: NEW YORK 13, CHICAGO 6, BOSTON 10, PHILADELPHIA 7.
EXPORT DEPARTMENT: 318-322 HUDSON ST., NEW YORK 13, N. Y.)



Practical SHORTS



Readers are invited to submit short, practical articles for this department. The items should be original and should relate to ways and means of handling production and maintenance jobs. Where possible, articles should be illustrated. Rough sketches only are required. Payment will be made for acceptable items upon publication.

Pouring a Babbitted Bearing

In emergencies, bearings can be poured with the journal in place, but it is better practice to substitute a mandrel which permits extra metal to be left for finishing. The shell and mandrel should be heated to 250 Fahr. so that the lining metal will not set and shrink without completely filling the mold. A mandrel hotter than that will cause air pockets or blisters to form. The heated mandrel should be coated with thin paper, oil, chalk or a thin clay and water mixture, to prevent the babbitt from adhering to it. The assembly should be caulked with clay to prevent loss of molten metal.

The bearing metal should be melted with care and particular attention should be paid to temperature. The pot should be pyrometer-controlled. Only new bearing metal should be used because the addition of scrap, which may be of a

different formula, might materially change the characteristics of the babbitt. The pot and bearing to be poured should be close to each other because the metal will cool fast in a ladle and would be poured too cool if carried far.

Babbitt metals are mechanical mixtures and tend to separate if left alone. Therefore, the molten metal should be kept thoroughly mixed, especially before pouring, by bringing the bottom metal up to the top. Do not stir round and round. Always stir over and over (See illustration).

With all parts of the mold clean, thoroughly dry and preheated, pouring may begin. If a bottom-pour ladle is not used, dross should be skimmed from the molten metal and a ladle of the self-skimming type should be used. Each liner should be poured complete in one operation and a ladle sufficient to accomplish this should be used. Pouring too quickly will prevent air in the mold from escaping and will cause blow holes or seams in the lining.

As cooling takes place, a certain amount of shrinkage occurs. Additional bearing metal should be added promptly as needed. Care should always be exercised to see that no moisture comes in contact with the molten metal. The steam formed will cause an explosion which will spray molten metal and may cause serious burns.—MAGNOLIA METAL COMPANY.

How to Balance Pulleys, Sheaves, Gears, Sprockets, Etc.

Rotating members that are out of balance often cause vibration and noise and the question is asked, "How can we balance that pulley, sprocket, or similar member?" Balancing can usually be done with sufficient accuracy by placing the member on a shaft that fits perfectly and then resting the shaft between two perfectly smooth and horizontal supports as shown in the accompanying sketch. A device of this type is practically frictionless and as a result the member will roll back and forth until the heavy side is at the bottom. Of course, if the member is in perfect balance, it will not roll.

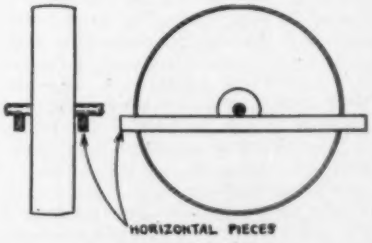
Let us say that you are balancing a pulley, and you have located the heavy side. By removing weight from the heavy side it is clear that the pulley eventually will be made to balance in every position—without rolling. Not until it does balance in every position can it be considered as having perfect "standing" balance.

If it is impracticable to remove weight from the heavy side, it will be necessary to add weight to the light side. The approximate amount of weight to be added to the light side may be determined experimentally by placing lumps of putty on that side and experimenting for balance until the proper amount of putty is stuck to the light side. Then remove the putty and weigh it. The correct amount of metallic weight to be added is thereby very closely ascertained. This is not absolutely correct because of the difference in density between putty and iron but it is generally close enough for all practical purposes. The metal, of course, should be attached in the location from which the putty was removed. If the metal is to be fastened into position by screwing, it is a good plan first to tap out and thread the hole and insert the screw which is to be used for fastening the metal piece in place. Then do your experimenting with the putty.

There are, to be sure, many different ways in which to accomplish the balance, hence these are merely suggestions. A good method is a combination of the two above. Use the putty method "approximately" so that the slugs bolted to the pulley on the light side will make that side slightly heavier than the other side of the pulley. Then, to make the pulley balance, drill or grind away sufficient metal so that a true balance is obtained. In this way the strength of the pulley will not be impaired by excessive drilling or cutting. It is important to make certain that, when removing weight from the heavy side, the pulley is not being weakened or rendered inoperative.

Sometimes the balancing can be accomplished by adding a screw or bolt to the light side. The screw should at first be too heavy. Then grind off weight from the screw until the correct weight remains. Sometimes the weights are riveted in place—not screwed. Whatever method is employed, make certain that the balancing weights will not rattle or become loose.

Although the principles of balancing are fairly easy to understand there is



more or less ignorance of the subject to be found even among engineers, surprising though it may seem. Thus in one instance a prominent manufacturer was informed by a user of one of his machines that the machine was "no good." The machine vibrated so furiously that the cement floor under it became cracked; the bearing covers would not remain in place without being tied on; and the rattling of the windows was terrific. An expert was sent by the manufacturer to look things over and make them right. The expert noticed, immediately, that the machine had been given a new coat of paint, but he went ahead and proceeded to balance the machine along the lines outlined above. He added weights

here and there and finally succeeded in making the machine operate smoothly and without vibrating. He then told the engineer that the weights he had added would have to be fastened there permanently. The engineer's face, at that point, turned quite red. He confessed that weights had been there before but he removed them while doing the painting in order to make it a better looking paint job. He filled the screw holes with putty and painted over the putty. He thought the weights were unnecessary, and he failed to associate their removal with the vibration that began immediately after the weights were taken off.—W. F. SCHAPHORST.

◆

Babbitt Anchorage and Shrinkage

Bearings that fail because they checked, cracked, crumbled or broke and chipped out in pieces usually have as the source one of two faults: either poor anchorage which let the liner come loose in the box or cracks which are produced by the shrinkage strains that set themselves up in the babbitt while it is cooling.

A loose liner is seldom a durable one if the work is at all hard. Whenever an old bearing comes back for repair, if examination shows the liner worked at all loose, it is time well spent to put into the box enough anchorage to hold the metal permanently tight before rebabbitting it. Often this can be done by drilling angled holes into the bases of the present anchors that will act as roots. When one can, drill two holes into each old anchor and set them opposite each other.

The accompanying sketch illustrates poor and good anchors. If there is tight grip of metal to box, heat generated in the bearings has free conduction through the frame and good dissipation of it occurs that helps to keep the bearing cool. But if looseness occurs, oil usually seeps in and lodges between the box and babbitt; and as its heat conductivity as to metal is as 1 to 200, its presence causes heat to be stored in the bearing, causing it to run warmer and making it a dangerous thing since at any time some slight mishap may happen to the lubrication.

After babbitt is poured, it immediately starts to contract as soon as it hits the mould and begins to cool. When poured it grips the bond or fills the anchors and it is difficult for it to obtain give to relieve the shrinkage strains from those sources. After entering the mould, unless the wall be extremely thin, it does not turn immediately from liquid to solid. Instead it first becomes a mush, in which state it remains over a noticeable period, gradually turning solid. While it is mush it has almost no strength, it is shrinking and shrinkage strains have set themselves up in it; as it can obtain no relief from them and as something has to give, these strains cause minute cracks to set themselves up in the metal. These often are invisible; yet they are there, to open later on as the result of vibration, shocks or strains that the liner may receive.

The warmer the babbitt was when poured, the more expanded it was and the more it will contract during cooling, hence, the more severe the shrinkage strains will be. The warmer it is the longer it will require to cool, hence, the longer it will remain in the mush stage and so give that much more chance for the cracks to form. If the mould or mandrel be overly warm, they also will cause the heat to hold longer in the cooling casting, thereby increasing the chance for cracks to form. Hence the surest way to stop the loss of linings that break from shrinkage cracks is to see to it the bearings are poured while metal, mandrel and mould are as cool as permits one to work with them without producing a misrun.

There is another kind of shrinkage which is at times bothersome—that which occurs in casting ribbed or threaded liners where, at some area in the mould, spots form that impair the bearing's perfection. One medicine will not handle all of these cases. As a rule the principles above apply but in some cases it is necessary to chalk or smoke the mould; and in some refractory jobs it is necessary to put a waste head on the casting in order to produce it entirely solid. Usually these shrink areas can be killed as follows: provide a medium large gate for pouring the babbitt and above that, so placed that its weight will bear on the metal in the casting, provide for casting a slug that weighs, one, two or fifty pounds according to the size of the casting and shrink area. The idea is to get enough weight above the casting and resting so directly on the cooling metal that its force will be sufficient to nullify the inclination of the babbitt to shrink. A few cases have been noted where fast chilling stopped this kind of shrinkage. — CARBONITE METAL COMPANY, LTD.

◆

Play Safe in Handling Organic Solvents

To prevent accidents, many plants find it helpful to store organic solvents in a centrally located store room, with a responsible person in charge of issuing the liquids. Supervised distribution of solvents assists in avoiding fires, dermatitis or vapor poisoning which may be associated with the careless or improper handling of these chemicals.

One source of accidents which can be eliminated through such a method of solvent distribution is the use of unlabeled or incorrectly labeled solvent containers. Usually, drums of solvents are carefully labeled by the shipper, with information as to the nature of the contents and proper handling methods. With a supervisor in charge, it is possible to make certain that the label on every solvent container corresponds to the label on the drum from which the solvent is obtained.

The use of a requisitioning procedure has been found useful in a number of respects. The requisition form contains a statement of the purpose for which the solvent is needed. In this way, misuse and unauthorized use of solvents are avoided. A regular tally of requisitions indicates those departments which employ relatively large quantities of solvents and which, therefore, require careful checking from the safety viewpoint. Requisitioning also prevents waste, and provides a check when solvent consumption seems excessive.—SAFETY RESEARCH INSTITUTE, INC.

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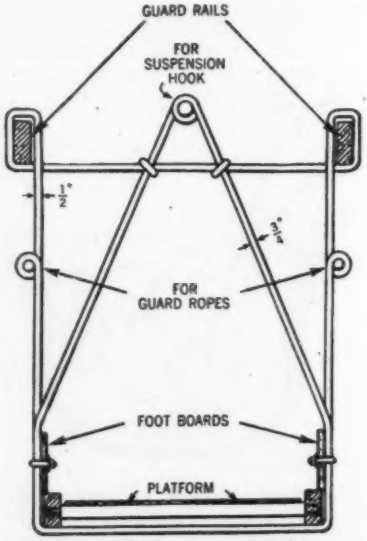
Suggestions on Swinging Scaffolds

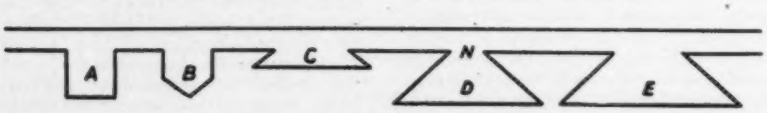
The swinging scaffold consists of a short, light platform supported by ropes. The platform itself usually consists of



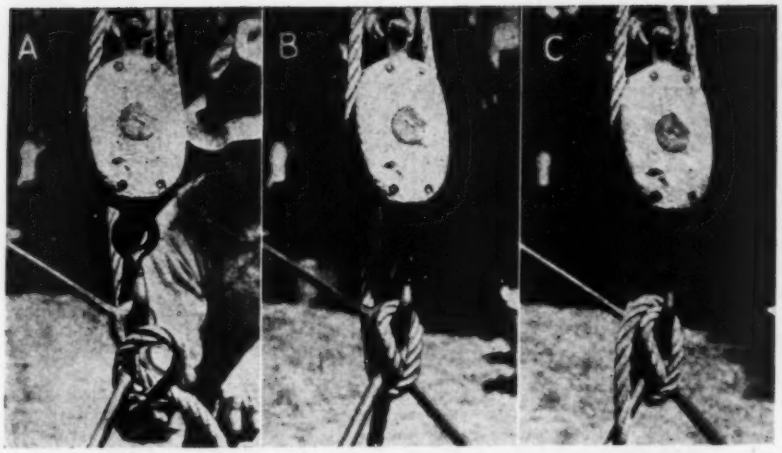
End cross section of a properly designed swing stage. Note safety features

planks laid upon a horizontal ladder of special construction—its side rails being parallel and farther apart than conventional ladders. Each end of the platform is supported by an iron stirrup or hanger which also serves for attaching the suspension ropes. The hangers should be so formed that guardrails can easily be secured to them, to keep men from falling off the platform.

The suspension ropes are arranged to run through a set of blocks in such manner that the workmen can easily raise and lower the staging right from the platform,



A & B—Have no taper or angle to grip metal with and where there is vibration or thrust babbitt will soon come loose. This also applies to C, as while it has angle, it is so shallow that it doesn't get hold of enough metal to hold it tight. . . . D—Is better as it is deep and well dovetailed, but it is so narrow at point N that if there is much strain it may shear off unless strong metal is used. . . . E—Is the only A1 anchor—wide, deep, strong, and well angled



The A-B-C of the "swing stage hitch." It holds securely with the stage at rest in working position and is easy to cast off and control when the platform is to be raised or lowered

the hook of the lower block being inserted through the eye or loop forming the upper part of the hanger. The "fall" rope is made fast to the point of the block hook in the manner shown in the illustrations (A, B, C.) This is called the "swing stage hitch" and is regarded as the only safe and secure hitch to employ at this critical point. Moreover, it is a hitch that may quickly be cast off.

The first hitch is, of course, made with the stage on its footing just below the point where the hooks have been secured and from which the "falls" have been lowered in order to make the hitch. When the stage has been raised from the ground and is in its various working positions, the hitch is still used and is made in the same way with the right hand, but aloft, the left hand reaches up and grasps the rope above the lower block and pulls slightly, to relieve tension on the rope below the left hand. The loop is then placed over the hook, the left hand releases its pull and the weight of the stage again locks the hitch on the hook. The same action should take place simultaneously at both ends of the stage when aloft, in raising or lowering the stage. It takes teamwork to move the stage up or down smoothly, keeping the platform reasonably level. Practically every move on the staging aloft must be made with care and deliberation.—NATIONAL LEAD COMPANY.

◆

Installation and Maintenance Of Leather Packings

Be sure to allow sufficient clearance between wall of cup leather and follower plate, but guard against excessive clearance.

Do not turn supporting ring to the shape of the packing which rests against it. The supporting ring should always be machined square.

Do not store leather packings in a hot or moist place.

Do not pile other material on top of leather packings.

Do not force leather packings into cylinder with screw driver or similar tool. If packing is too hard and difficult to insert, merely soak in warm oil or water until leather is sufficiently pliable to install.

Do not allow foreign matter to accumulate in system, as it may get into the cylinder and damage both the packing and the cylinder or plunger.

Do not expect long packing life when packing comes in contact with scored or pitted plungers and cylinders. For efficient service and long life, cylinders and plungers should be perfectly smooth and true to dimension.

Do not install packing where either the plunger or gland ring is worn. The packing can catch in the clearance between the plunger and gland ring, causing its premature failure. — ALEXANDER BROTHERS.

◆

How to Use a Ladder

Ladders should be constructed according to the safety code approved by the American Standards Association. They should not be painted, but may be varnished or protected with some suitable colorless preservative that will not hide defects which may develop during use.

When a ladder is placed against the wall or other fixed object, the angle of the ladder with the floor or ground should not be less than 75 degrees, unless the ladder is securely fastened or a man holds it. In other words, the horizontal distance from the wall to the foot of the ladder should not exceed one-quarter of the ladder's length.

There should be sufficient clearance back of the ladder to enable the climber to get a secure foothold on the rungs. A clearance of at least six and one-half inches is recommended.

Likewise, there should be proper clearance in front of the ladder so that the user will not have to assume a forced or unnatural position while working or climbing. A clearance of at least 30 inches is recommended. A continuous clearance of at least 15 inches on each side of the center line of the ladder also is desirable.

Make certain the ladder has a sturdy secure footing before climbing. Ladders with non-slip bases are preferable to those without this feature. For wood floors, cork, sharp metal points or lead-coated bases are recommended; for an iron floor, carborundum or similar non-slip material has been found to serve well. For wet floors, recessed rubber bases have proved satisfactory. Obviously, the safest practice is to station a man at the bottom of the ladder, or to tie it securely.

When it is necessary to place a ladder in front of a door that opens toward the ladder, make certain the door is locked.

Ladders should never be placed against window sashes or mullions. If a ladder must be used in such places, securely attach a board across the top of the ladder so that the ends of the board will bear against the wall or frames at the sides of the window.

In going up or down a ladder always face it and maintain a grip on the side rails. The familiar warning of "Watch your step" should be observed with every move up or down a ladder.—NATIONAL LEAD COMPANY.

◆

Clean Bearing Shells Before Rebabbitting

The first step in relining a bearing is to remove the old metal and thoroughly clean the shell. Old babbitt should be chipped or melted from the shell. If the shell is steel or iron, a blow-torch may be used. All traces of oil, dirt, scale, rust and old lining metal must be removed by burning, sand blasting, tumbling, wire brushing, and pickling or a combination of these. All anchor holes or grooves should be well cleaned—by hand if necessary—in order that new metal may flow in to form a secure anchor. After this has been done, the surfaces should be scraped with a file or course sand paper to give a better surface for bonding.

Bronze shells should be dipped in a pot of scrap babbitt heated to 825 Fahr. to melt out the old metal, after which they should be bored and tinned on the entire surface to be lined.

A good bond between shell and lining is of the utmost importance. Otherwise, the lining is likely to crack or loosen. Bronze shells do not usually require more than complete tinning to hold their liners fast, but where trouble has been experienced or where double precaution is desired, anchor holes or under-cut grooves should be provided. Ordinary tinning of iron or steel shells is not dependable and, if a completely used bond cannot be assured, ample anchor grooves are necessary.

This babbitt liner can be bonded to iron and steel shells without anchors, provided the ferrous surfaces are cleaned and prepared chemically. After such a pickling program the process calls for preheating the bearing in the tinning material and then babbitting while the tinning surface is still in a molten state. A fused bond is then obtainable. This type of babbitting, as a rule, is practical only for equipment manufacturers with production runs.—MAGNOLIA METAL COMPANY.

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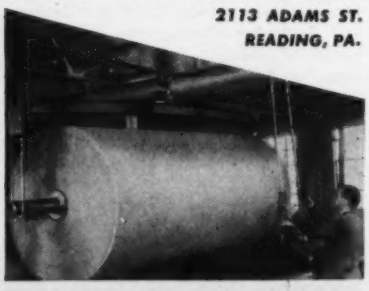

READING
HOISTS

Convention Papers . . . Abridged

Abridgments in this section are from papers presented at the annual meeting of the **Technical Association of the Pulp and Paper Industry** held in New York City, February 24-27, 1947.

Modern Recausticizing Plant Practice

ROBERT F. CLEMENS, Chemical Engineer
The Dorr Company

It is the object of this paper to describe a modern kraft continuous recausticizing plant and to discuss the more important considerations governing the selection and the operation of the various units of equipment. The accompanying flowsheet outlines the unit operations and indicates quantitatively the flows of liquor and the distribution of soda throughout the system. The flows of liquor are given as cubic feet per ton of pulp, and the distributions of total soda as pounds (Na_2O) basis per ton of air dry pulp.

Several basic relationships between the various flows are evident. For example, the volume of green liquor is 125 per cent of the volume of white liquor, and the volume of wash water is 114 per cent of that of the white liquor. It is evident that the amount of water that can be added to the system is determined by the volume of white liquor produced and by the volume of water which leaves the system with the washed and filtered lime mud and with the washed dregs discharged to waste from the dregs washer. It should also be noted that all of the water added to the system is introduced as wash water so that it can be utilized first to recover soda from the lime mud and green liquor dregs before it is used to dissolve smelt. Any water added in any other way reduces in like volume the amount of water which can be added as a wash, thereby lowering the washing efficiency of the entire system.

The distribution of wash water, as shown in the flowsheet, while subject to some variation from plant to plant, is about the optimum in most cases. Not shown in the flowsheet is a small amount of spray water added to the classifier to wash the rejects, consisting of grit and cores. This small amount of spray water just about balances the water that goes into chemical combination in the slaking reaction, plus evaporation losses in the slaker, and, therefore, does not materially affect the water balance in the system.

The distribution of soda, as shown in the flowsheet, indicates that of the total amount of soda leaving the smelt dissolver, about 1.6 per cent, is carried along with the dregs from the Green Liquor Clarifier and 20 per cent is carried along with the lime mud from the White Liquor Clarifier. The flowsheet also shows that approximately 98 per cent of this soda, entrained with the settled dregs and the lime mud, is recovered by the dregs and lime mud washing steps in the form of weak liquor, which is recirculated for the dissolution of smelt. Thus about 21 per cent of the total soda in the system is continuously recirculated via the weak liquors, and only about 1 per cent of the soda entering the recausticizing system is lost.

The soda, as indicated at the various points in the flowsheet, exists chiefly as Na_2CO_3, Na_2S, NaOH, Na_2SO_4 and is reported as total soda expressed as the equivalent Na_2O. It should be understood that after causticizing, the cauticizing efficiency (the ratio of NaOH to NaOH plus Na_2CO_3, all as Na_2O) will be approximately 85 per cent, while before causticizing this ratio will be of the order of 18 per cent. The sulphidity (the ratio of Na_2S to total titratable soda, all as Na_2O) is 30 per cent and is, of course, the same before and after causticizing.

Referring again to the flowsheet, the following unit operations will be noted: 1—Lime Slaking, 2—Grit Classification, 3—Causticizing, 4—White Liquor Clarification, 5—Lime Mud Washing, 6—Lime Mud Filtration, 7—Lime Reburning, 8—Green Liquor Clarification and 9—Dregs Washing.

Liquor storage tanks have not been included in the flowsheet, but it is obvious that adequate storage tanks for white liquor, green liquor and weak liquor are requisite to smoothness and continuity of operation of the pulp mill as a whole. The various steps, or unit operations, will now be discussed in the sequence shown in the flowsheet.

Step 1—Lime Slaking

Reburned lime is brought in contact with the green liquor in the slaker and the slaking and recausticizing reaction is started. The slaker should be operated to deliver a slurry of completely slaked lime under conditions which will yield, after causticizing, (1) a calcium carbonate which will settle to a low dilution and (2) a clear white liquor.

Broadly, it is desirable to maintain the liquor to lime ratio as low as possible, consistent with smooth operation. This keeps the volume being put through the slaker at a minimum. Therefore, for any size of slaker, the lime is given the maximum time to slake completely.

One of the most important variables which affects the slaking operation and the settling properties of the resulting calcium carbonate is the quality of the lime. A reasonably fresh, hot, well-burned lime will slake very rapidly and will yield a fast settling mud, requiring less than one-half of the settling area for white liquor clarification as a lime mud produced when using cold, aged reburned lime. Similarly, cold new make-up lime is known to slake more slowly and to yield a slower settling carbonate than hot reburned lime. It is, therefore, obvious that reburned lime should not be stored for long periods before reuse. Furthermore, in order to minimize the effect of the poorer slaking properties of cold make-up lime, it is wise to provide for the continuous blending of the

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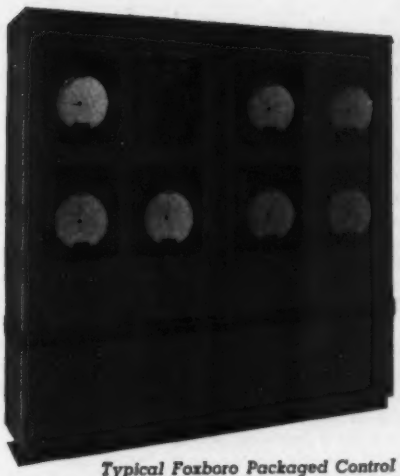

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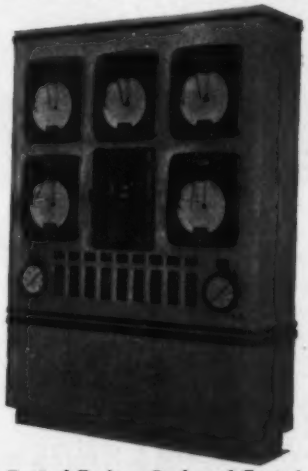

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cold make-up lime with the hot reburned lime in the continuous feeder leading to the slaker.

While the lime should be slaked as soon as possible after calcination, from a practical point of view, it is desirable to process the lime through a small storage bin and to feed from this bin to the slaker. This permits the required control of the rate of lime addition to the slaker and also permits the lime to be used while sitll hot. Also this provides a storage cushion, so to speak, between the lime kiln and the slaker.

The lime should be hot before slaking and it is equally important that the green liquor be at least 200 Fahr. to insure rapid and complete slaking. With a green liquor temperature of 200 Fahr. and with fresh hot lime, a detention period in the Slaker of 10 minutes will generally insure complete slaking.

Another variable in the slaking operation which has a marked effect on the settling characteristics of the lime mud after causticizing is the amount of excess lime. The excess lime should be kept to a minimum since both the settling and the filtering rates of the lime mud fall off rapidly as the excess lime is increased.

It is obvious that when contacting hot lime with 200 Fahr. green liquor there will be considerable evolution of steam. Therefore, the slaking equipment must be properly ventilated. Closely tied in the ventilation is the problem of the introduction of lime and liquor. The direct introduction of the lime by means of a screw conveyor is usually most satisfactory regardless of the type of slaker. Chutes and nonpositive types of feeders should be avoided since they invariably plug up with a sticky paste-like deposit.

Lime slaking equipment in a causticizing plant should be very rugged; heavy white iron, concrete or refractory liners are required; and agitators should be of stainless steel.

Step 2—Classification

It is necessary to remove the inert matter from the lime, otherwise this inert material builds up in the circuit, gradually lowering the available CaO of the recycled lime to the point where the circuit has to be purged at intervals and a fresh start made with all new lime.

It has been demonstrated that by classifying the slaked lime slurry at about 65 mesh and discarding the course fraction, the availability of the lime in the circuit can be maintained at close to 85 per cent.

For the classification to be effective, sufficient area must be provided in the classifier to give an upward velocity through the unit of approximately 0.5 fpm, with a slurry concentration of about 10 per cent solids, $CaCO_3$ basis, which is approximately the concentration after all the green liquor has been added. The agitation in the classifier should be limited and controllable. The de-gritted overflow from the classifier should be taken off across a weir to minimize velocity effects.

The means for removing the settled grit should be continuous and mechanically positive. Methods which depend on the grit rolling or sliding will invite trouble.

Adequate drainage of the grit before it is discharged from the classifier, is, of course, desirable so as to minimize the loss of soda and to facilitate disposal. A small quantity of wash water is usually applied as a spray before final drainage of the grit to wash back and recover fine entrained lime and strong soda liquor. All classifier parts should be of extra heavy construction or stainless steel.

Step 3—Causticizing

Up to 65 per cent of the causticizing reaction is completed in the slaking and classification step, but considerably more detention time must be provided before this reaction reaches equilibrium. The reaction rate falls off rapidly as equilibrium is approached. It is, therefore, customary to pass the partially causticized slurry from the classifier through three agitator-equipped tanks in series, called causticizers, and in which a minimum detention of one hour, but preferably 1.5 hours, is provided. Three tanks are specified to minimize short circuiting and to afford protection in case of enforced shutdown of one. A causticizing efficiency (the ratio of NaOH to NaOH plus Na_2CO_3, all as Na_2O) of between 80-85 per cent is usually obtained and this a good practical range.

The agitators should be of stainless steel and the tanks should be acid-proof brick or concrete lined.

Step 4—White Liquor Clarification

The slurry from the causticizers is now ready for clarification, to yield a white liquor suitable for use in the digesters, and a thickened lime mud, ready for washing to recover soda, and for reburning.

The first consideration in the determination of white liquor clarification equipment is that of the required settling area. The basic design figure used to determine this settling area is the so-called "unit area," expressed as sq. ft. of settling area per ton of lime mud (dry) per day. Tests in the field indicate a wide range of unit areas, ranging from about 8 sq. ft. per ton of lime mud per day to over 20 sq. ft., depending largely on the quality of lime being used.

For new plant design a figure of 16 sq. ft. per ton of lime mud per day is usually used. This is a conservative figure, but it is justified since it gives sufficient area to tide over those periods when the settling properties of the lime mud are impaired due to poor lime, to over liming or to other departures from the normal. Also this basis of establishing settling areas assures an overflow of maximum clarity.

With this total area established, a decision can be made as to the number of compartments to specify for a tray thickener, or, if the area is very small, a choice can be made on whether to use a unit thickener or a tray thickener. In almost all cases a tray thickener is indicated, to save floor space and reduce heat losses. The area of the tray thickener to be specified is equal to the total settling area required, divided by the number of compartments. The compartments are arranged to operate in parallel. For exam-

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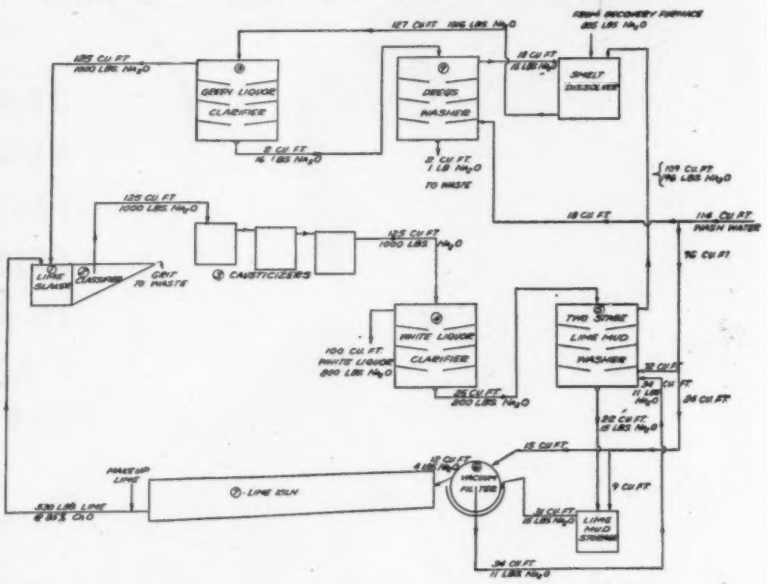
Kraft Recausticizing Plant—Process Quantity Flowsheet

(All quantites are expressed as cubic feet or pounds per ton of air-dry pulp)



Basis:
100 cu. ft. white liquor per ton pulp
8.0 lb. total alkali as Na_2O per cu. ft.
7.0 lb. active alkali as Na_2O per cu. ft.
30 per cent sulphidity
White liquor clarifier underflow 33 per cent solids
Lime mud washer underflow 40 per cent solids
Filter cake 55 per cent solids
900 lb. of lime mud (dry) per ton of pulp handled in steps of 1 to 6 inclusive
15 lb. of dregs per ton of pulp handled in steps 8 and 9
Soda reported is total soda as Na_2O
Volumes reported are liquor volumes without suspended solids

ple, for a 220-ton pulp mill, the lime mud tonnage will be about 100 tons per day. Based on a design unit area of 16 sq. ft. per ton of lime mud per day, the required settling area is 1,600 sq. ft. Using a 4-compartment tray thickener, the required area per compartment is 400 sq. ft. or a 23 ft. dia. unit. Using a 3-compartment tray thickener, the required area is 533 sq. ft. or a 26 ft. dia. unit.

The depth of each tray thickener compartment is important. Excessively deep compartments are of no benefit, but there are certain minimum requirements which should be met. It is true that as little as 3 ft. of depth is sufficient for clarification. However, once the solids have settled to a consolidated pulp, sufficient additional depth must be provided to give the lime mud pulp enough detention time to reach maximum density. At least 2 ft. and preferably 3 ft. should be allowed for this sludge thickening. Therefore, the depth of each compartment should be at least 5 ft. to permit the continuous discharge of mud at maximum final density.

The tray thickener design should provide for the equal division of the feed to each compartment and the withdrawal of the corresponding equivalent overflow from each compartment. The settled sludge should be concentrated to maximum final density before being pumped from the unit. Positive mechanical action to rake the settled sludge to the point of discharge is imperative. Without positive raking, a low concentration of solids in the discharge will result.

Considerable corrosion is encountered in white liquor clarification equipment. Adequate protection must be provided. The feed and overflow boxes should be of stainless steel or at least be concrete-lined, especially the feed box, due to the combined action of the white liquor, the abrasive action of the calcium carbonate, and exposure of the feed to aeration. Stainless steel boxes are excellent, but add very materially to the cost. The other points of corrosion are the trays, internal boots, etc. Some users are standardizing on ⅜-inch plate for these parts, although the more usual standard is ¼ inch. The thickener tank should be of at least ½-inch plate on the sides and bottom.

While overloads resulting from an excessive accumulation of solids in the thickener are not common, motorized and hydraulic lifting devices now permit the rakes to be readily raised and lowered with a minimum of operating effort. This permits an operator to work out an occasional overload with relative ease, and also facilitates shutting down and starting up operations.

An instrument for continuously recording the load on the thickener raking mechanism is of great assistance in operating, and gives a daily record on all shifts. This instrument should be included on every white liquor clarifier installation.

Step 5—Lime Mud Washing

In the flowsheet, a white liquor clarifier underflow, containing 33 per cent solids, is indicated. This underflow will contain 200 lb. of soda per ton of pulp and 900 lb. of lime mud. Therefore, the lime mud contains 22.2 per cent soda on a dry lime mud basis. If the underflow from the white liquor clarifier is pumped at a concentration lower than 33 per cent solids,

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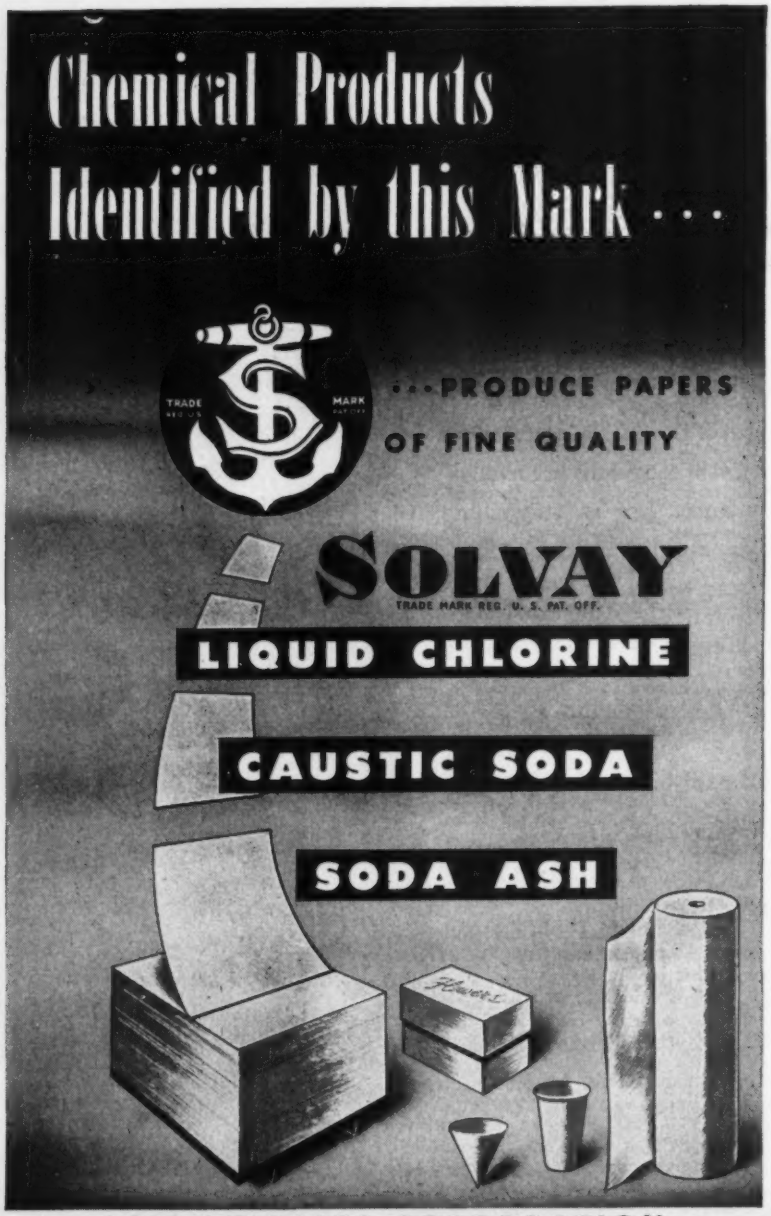
the soda will, of course, be correspondingly higher. Obviously the solids content of the white liquor clarifier should be as high as possible to reduce the amount of soda that must be recovered by washing.

The modern recausticizing plant provides for two stages of lime mud washing by subjecting the lime mud to two successive decantations, using fresh water and filtrate for the second stage and the overflow from the second stage as dilution water in the first stage. The overflow from the first stage contains the recovered soda and goes to weak liquor storage. The settled solids from the second stage are filtered before calcination just as in the single stage washing arrangement. The material balance flowsheet accompanying this article is based on two stages of lime mud washing.

The use of two stages of lime mud washing, followed by vacuum filtration, will easily reduce the soda content of the lime mud going to the kiln to 0.5 per cent as water soluble Na_2O. This will result in improved filter performance and increased life of kiln lining. However, there is another very important advantage of two stages of lime mud washing in that the lime mud, prior to filtration, is low enough in soda to be fed directly into the kiln during an emergency when a filter is out of service.



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The two stages of lime mud washing can be carried out in a single tray thickener, rather than in two units, and this is preferred. The two-stage lime mud washer should be of a flexible design so as to permit its being operated as a white liquor clarifier in an emergency. Actually the settling area requirements for each stage of lime mud washing is about one-half of the total area requirements of the white liquor clarifier, so that the two stages of mud washing provide sufficient area to take care of the white liquor, when necessary.

Corrosion in the lime mud washer is not severe, but usually the same plate thickness is specified as for the white liquor clarifier, but stainless steel boxes are not used.

Step 6—Lime Mud Filtration

The lime mud, after being washed in sedimentation equipment, is diluted in a lime mud storage tank and then dewatered on a vacuum filter. This filtration step reduces the moisture in the lime mud fed to the lime kiln, thus effecting fuel economies, and also reduces the soda content, due both to the dewatering process and to the displacement washing with shower water.

Step 7—Lime Reburning

The dewatered lime mud is fed to a continuous rotary lime kiln in which the calcium carbonate is converted to lime for reuse. No attempt to cover the subject of lime reburning will be made in this paper since obviously this is a major subject in itself.

Another development of interest is the use of limestone as a source of new lime make-up. It has been demonstrated that it is feasible to add limestone directly to the kiln to satisfy the lime make-up requirements. Whether or not this procedure should be followed depends on local conditions, including the relative cost at the site of new lime and limestone and the reburning costs.

Step 8—Green Liquor Clarification

Reference to the flowsheet will show that the weak liquors from the lime mud and dregs washers, after being returned to the smelt dissolver, are built up in soda content by dissolving the smelt. This weak liquor, after passing through the smelt dissolver, is called green liquor. This green liquor will contain small amounts of suspended solids, consisting chiefly of carbon, refractory material and iron compounds. In modern recovery boiler practice, these solids will average about 10-15 lb. per ton of pulp. It is necessary to remove these solids as they will be trapped with the lime mud and build up in the lime circuit, causing a progressive drop in the lime availability.

Therefore, the green liquor is clarified by sedimentation in a tray thickener similar to the white liquor clarifier in design but no special protection against corrosion is required, except that the plate should be the same thickness as that in the white liquor unit. Usually the area requirements of the green liquor clarifier will be the same as the white liquor clarifier or slightly less.

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Step 9—Dregs Washing

The settled solids from the green liquor clarifier will average about 10 per cent solids which, based on 15 lb. of dregs per ton of pulp, means that about 16 lb. of soda, as Na_2O, per ton of pulp is entrained with the dregs. This corresponds to 37 lb. of salt cake per ton of pulp which in a 200-ton mill is almost 4 tons of salt cake per day. While this is a very small percentage of the total soda in the system, it obviously would represent a serious loss if discarded and, therefore, the recovery of this soda is of importance.

The recovery of the soda in the green liquor clarifier underflow is accomplished by giving the dregs three or four stages of counter-current washing in a washing type tray thickener or dregs washer. In this unit the compartments are arranged to operate in series in contrast to the white and green liquor units where the compartments operate in parallel. The solids are processed downward through the unit, being successively reslurried with overflow liquor from the compartment below and allowed to settle. The wash water is processed up through the unit, being first introduced into the bottom compartment and finally flowing from the top compartment to weak liquor storage. Usually between 15 and 20 per cent of the total wash water that can be added to the recausticizing plant is added at the dregs washer. The remainder is used for washing the lime mud.

Due to the small amount of soda involved, frequently just three stages of dregs washing are specified. However, the additional cost of a four-stage washer over a three-stage unit is not great, and the savings in soda will generally pay for the additional stage in about one year. Another consideration which frequently is decisive in favoring the four-stage unit over the three-stage unit is that the additional depth of the four-stage unit may permit gravity flow of the overflow to the weak liquor storage tank which is now practicable with a three-stage unit.

Corrosion in the dregs washer is not severe and no special construction is required.

Instrumentation

As in other phases of process work, control instruments are finding increased applications to facilitate recausticizing plant operation. The modern plant frequently includes the following instruments: wash water flow recorder-controller, wash water temperature recorder, green liquor flow recorder-controller, green liquor temperature recorder-controller, temperature recorder to first causticizer, white liquor flow recorder, storage tank level indicators, and torque recorders on the white liquor clarifier and lime mud washer.

The type of continuous recausticizing plant discussed in this paper has been in a process of continuous evolution and betterment for more than 20 years.

Experience has shown that such a system is not only more efficient and economical than the old-time batch system, but more important still, is far easier to operate and keep in balance.

Three advantages attending the use of the system are basic in that they have a carry-over value into other steps in the pulp making cycle. These are:

1. *A uniformly clear and strong white liquor*—This makes it easier to control and operate the digesters and results in the more uniform production of a pulp with the desired qualities.

2. *A uniformly well-washed lime mud*—This improves filter and kiln operation; increases the over-all recovery of soda; and greatly lengthens the life of the kiln linings which are injuriously affected by soda solution.

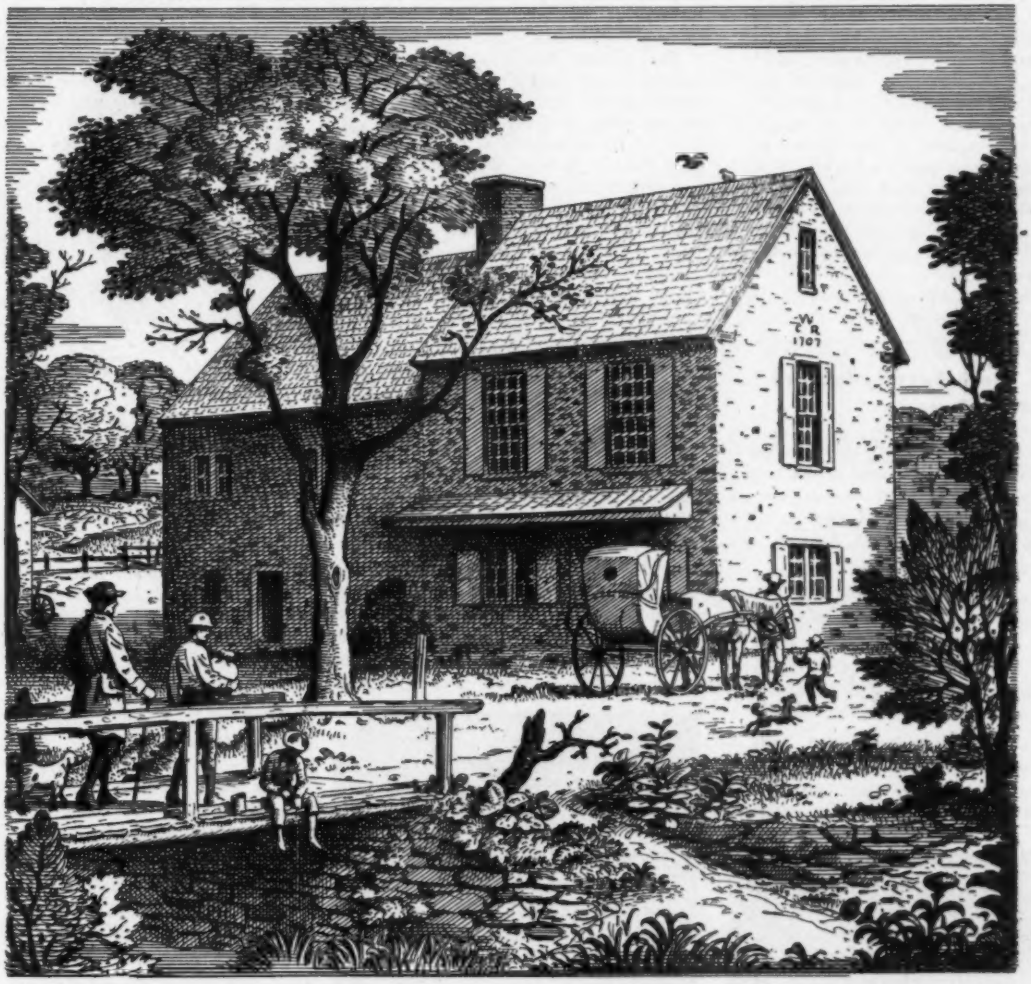
3. *A uniformly, well-washed green liquor dregs*—This also reduces the total soda loss.

Application of the Electric Hygrometer to the Determination of Water-Vapor Permeability at Low Temperature

J. A. VAN DEN AKKER, Research Associate
The Institute of Paper Chemistry

Several years ago, it was proposed that WVP be measured by means of a purely hygrometric method (1. Part I). Good sensitivity was expected on the basis of the fact that the change in mass of water vapor in a small volume of air corresponding to a 1 per cent change in relative humidity is very small. It was expected,

This lovely home, built by William Rittenhouse in 1707, still stands in Fairmount Park, Philadelphia.



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In 1690, William Rittenhouse set up at Germantown, Pennsylvania, the first paper mill in America. To the people of the new land, this mill was a shining symbol of their self-sufficiency. It meant the promise of something they had dreamed of—paper not only for letters, records, pamphlets, books, but—someday—paper for a free press.

What they could not know was that this tiny mill marked the beginning of one of the wonders of the industrial world—the great American pulp and paper industry.

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and the expectation has been realized, that very low rates of transfer of water vapor could be evaluated through measurement of changes in relative humidity. An important phase of the problem was the development of a hygrometer which would be small, accurate, sensitive, and which would not absorb an appreciable amount of moisture in the act of measuring relative humidity. Thanks to the ingenuity, care, and patience of Mr. Willmer A. Wink of our staff, who is largely responsible for the laboratory work on this project, a very satisfactory modification of the Dunmore electric hygrometer was evolved.

The Dunmore hygrometer (3) in its usual form is satisfactory for the measurement and control of relative humidity in fairly large spaces, such as those in cabinets, rooms and ducts. Its moisture absorption capacity is, however, too large for the hygrometric WVP methods.

The present hygrometers are of extremely simple design. A sketch, showing various details of an element mounted on a glass plate, is given in Figure 1. The body of the element is a small square of glass (about ½ inch on a side and ⅛ inch thick), on which a very thin film of platinum (opaque in strong light) has been deposited by evaporation in a vacuum or by the cathodic sputtering process. Prior to the deposition of the platinum film, the glass body is mounted on a metal plate and a fairly fine wire (roughly B & S gage 18) is pulled tautly from one edge of the metal plate down over the middle of the glass body to the opposite edge of the plate. This wire, which is subsequently removed, serves to form a gap in the film, thus providing two platinum film electrodes. (Where one wishes to prepare several elements, glass strips ½ inch wide and a few inches long are placed side by side on the metal

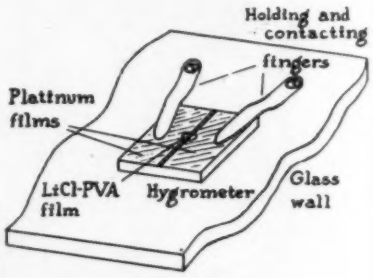

Figure 1

plate, and a wire is drawn tautly over the long axis of each strip. Prior to the coating process, the strips were scratched cross-wise on their bottom surfaces, at ½-inch intervals, so that ½-inch square elements could be quickly formed after the deposition of the platinum film by breaking the glass strips at the scratch lines. This method of preparation has the added advantage of insuring that the edges of each glass square at the ends of the gaps will be free of short-circuiting films of platinum.)

A film of partially hydrolyzed polyvinyl acetate (PVA) containing a suitable, low percentage of lithium chloride (LiCl) is applied to the center of the gap with a small glass rod having a tapered, fire-

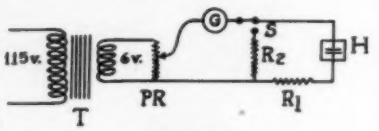

Figure 2

polished tip. The area of the spot thus formed is about 2 sq. mm. Further details are presented in Report 30, Part VIII, to the APPA (2).

After the LiCl-PVA film has been allowed to age for several days, the element is mounted in the WVP apparatus. As shown in Figure 1, the simplest means for mounting is provided by a pair of spring-metal fingers (e.g., phosphor-bronze), which serve to hold the element in place and furnish electrical connection between the platinum film electrodes and brass bolts through a large glass base plate or wall of a glass vessel. The connection between bolts, nuts, and glass on the opposite side of the wall are rendered gas tight by the application of hot wax.

A single, simple electrical unit, the circuit of which is shown in Figure 2, enables one to measure the current through any one of a large number of hygrometers. Connection of the circuit to a unit is easily made by means of a pair of small "alligator clips." The voltage applied to the series combination of gal-

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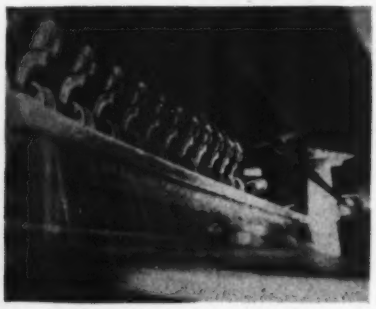
matter, Beatex disperses these particles, greatly reducing spotting and discoloration. Many users report that as long as they use Beatex, their slime control problems are notably reduced.

Scale Removal on Acid Heaters and Evaporators

Removal of scale from the steam side of acid heaters and evaporators is highly effective with Magnus D-scale-R, the inhibited acid cleaner which is completely safe for all metals. A hot 8-oz. per gallon solution is used to fill the steam side of the equipment from the bottom up to insure elimination of air pockets. After scale and rust have been dissolved, the system is flushed with water plus a small amount of soda ash.

Holding Felts in Condition During Shut Downs

If a 1% solution of Magnus NX is applied through the showers to the wet felts when the system is about to be shut down, they will be ready for immediate and perfect functioning when the system is started up again, even when shut down is considerably in excess of a week-end.



Magnus NX is a completely neutral soapless material with unusually speedy penetrative properties. It is used not only as described above, but for breaking in new felts and for cleaning and reconditioning felts on and off the machines.

Prevention of Size Sticking

Starch, casein and other sizes which tend to cause paper to stick to calender rolls can be treated with a relatively small quantity of Magnus 58 to provide adequate lubrication of the size mix and to eliminate sticking.

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vanometer, hygrometer, and protective resistance is observed and adjusted by switching the galvanometer to R_s and manipulating the potentiometer rheostat PR. This voltage, which may be from about one to five volts, is held at the value adopted in the standardization of the hygrometer. The galvanometer is then switched to the hygrometer, the deflection of the galvanometer is noted, and the relative humidity is read from the calibration chart for the particular hygrometer. Typical calibration curves for various applied voltages are given in Report 30, Part VIII, to the APPA (2).

The required sensitivity of the galvanometer depends upon the temperature of the hygrometer. At room temperature, the galvanometer may be a microammeter having a range from about 0 - 50 microamperes, the range depending upon the applied voltage. However, at low temperatures, the effective resistance of a small hygrometer of the type described is quite high, and the galvanometer should have good sensitivity, preferably of the order of 1 to 5 x 10^{-9} ampere per division. If equipped with a series of sensitivity taps, the same galvanometer may be employed over a wide range of temperatures. The galvanometer must, of course, be equipped with an instrument rectifier.

The hygrometers may be conveniently calibrated at room temperature by exposing them to various relative humidities fixed by saturated salt solutions. Calibration at low temperature is, however, a very different matter. The relative humidities over saturated salt solutions at temperatures in the neighborhood of 0 Fahr. are much too high to be useful, because they are typically of the order of 90 to 100 per cent. Accurately known relative humidities may be produced and held constant by means of a double cryostat (2).

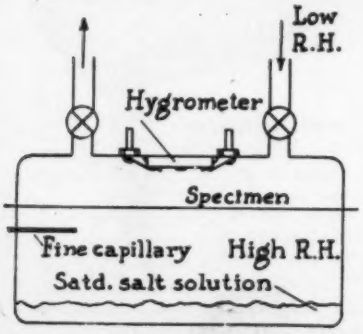

Figure 3

Determination of WVP by Hygrometric Methods Employing the Small Electric Hygrometer

Dynamic Method. The most simple, sensitive, and fast method has been termed the dynamic method because it involves unsteady-state and non-equilibrium conditions. The great advantage of the method is that, where applicable, a determination of WVP can be made in minutes or hours after the preconditioning period required for a specimen to equilibrate with the high and low humidities with which its faces are placed in contact.

A schematic sketch showing the arrangement for the testing of WVP with the dynamic method is given in Figure 3. The apparatus is contained in a liquid-tight vessel (not shown) which is immersed in the warmer cryostat. Dry air of known relative humidity from the colder cryostat is circulated over the specimen during the preconditioning period. The relative humidity of the air below the specimen is maintained at a constant, high value by means of a suitable saturated salt solution. When the test is begun, the valves are closed and the time is noted. The relative humidity is subsequently measured at suitably spaced times, and the data are plotted against the time. The initial rate of change of the relative humidity is not expressed in per cent, but in units of the scale on which the relative humidity of a saturated atmosphere is 1.0. The theory enabling one to calculate WVP from the initial rate of change of the relative humidity has been given in Parts V and VII of Report 30 to the APPA (1), and we are glad to say that the theory has been simplified in Part VIII of that report (2).

The fine capillary shown in Figure 3

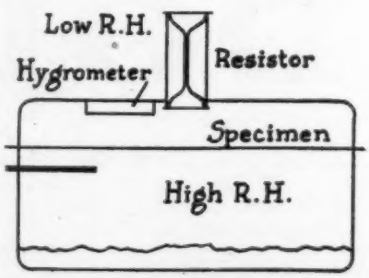

Figure 4

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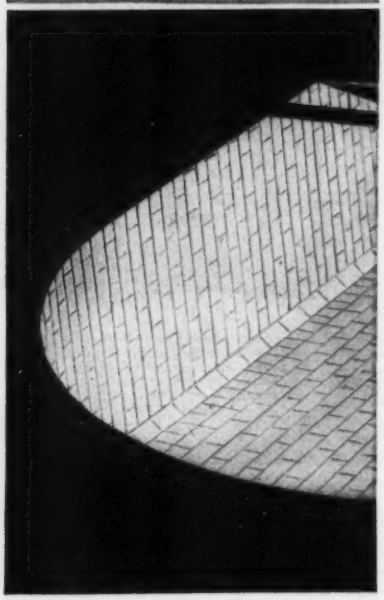

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serves to equalize the pressure in the lower compartment with that of the atmosphere. (The diffusion of water vapor through the capillary has no significant effect on the relative humidity in the lower chamber.)

For the purposes of our research, WVP determinations have been made on one specimen at a time because of limited space in the cryostat. Where it is necessary to test a large number of specimens, it is suggested that a number of units of the kind previously described for work at room temperature (*1*) be prepared for use in a low temperature room in which the temperature is controlled and the relative humidity maintained at a constant, low value.

Comparison Method. The comparison method may be understood by referring to the sketch presented in Figure 4. At equilibrium, the rate of diffusion of moisture through the specimen is equal to that of moisture passing through a standardized resistor. The resistor (one of a set covering a large range) is selected to have a permeability of the same order as that

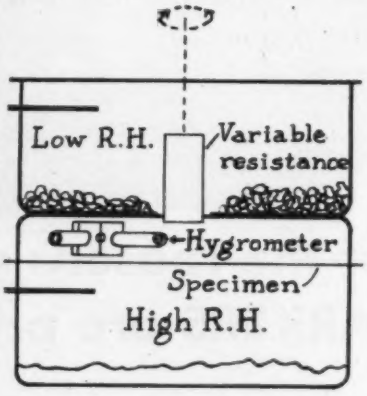

Figure 5

of the specimen, so that the equilibrium relative humidity measured by the hygrometer in the upper compartment will be nearly midway between the fixed high and low relative humidities in the spaces, respectively, below the specimen, and outside of the test unit.

The resistors employed in this method (whether fixed or variable) should be calibrated by careful observation of rate of loss of weight of a testing unit containing no specimen. In this standardizing work, the fine capillary in the side wall of the lower compartment should be sealed (a tiny drop of oil will accomplish this and permit pressure equalization), and great care should be exercised in obtaining a good seal between the two compartments.

The lower end of a resistor should be near the top wall of the upper compartment, because close proximity of that end to the specimen in normal testing would no longer permit us to assume that the diffusion resistance of the air in the upper compartment is negligible.

Testing with the comparison method can be accelerated if the specimen is preconditioned with air above the specimen (for example, the air of the room) having a relative humidity equal to the end-point value. It is then necessary to furnish the testing unit with a third compartment enclosing the upper end of the capillary in a space of low relative humidity, as shown in Figure 5. This can be accomplished, of course, by distributing a desiccant over the floor of the third compartment. If this desirable modification is attempted, the electrical leads to the hygrometer should be brought through the side wall of the middle compartment.

If the specimen is preconditioned as suggested in the foregoing paragraph, the initial relative humidity will be equal to the end-point value. It, therefore, behooves the operator to observe (at not too frequent intervals of time) slight variations of the relative humidity away from the predetermined value, and to make suitable adjustment of the resistance (assuming the more ideal case of a standardized variable resistance). When he believes that balance has been attained, he should continue his observation for a suitable period of time (a fraction of an hour, or many hours, according as the permeability is high or low).

Sweep-gas Method. The sweep-gas method, similar to that employed by Davis (*5*), (who gives reference to earlier workers), can be explained by reference to the schematic sketch given in Figure 6, which depicts a simple form of apparatus embodying the hygrometric principle that is called into play. Two compartments

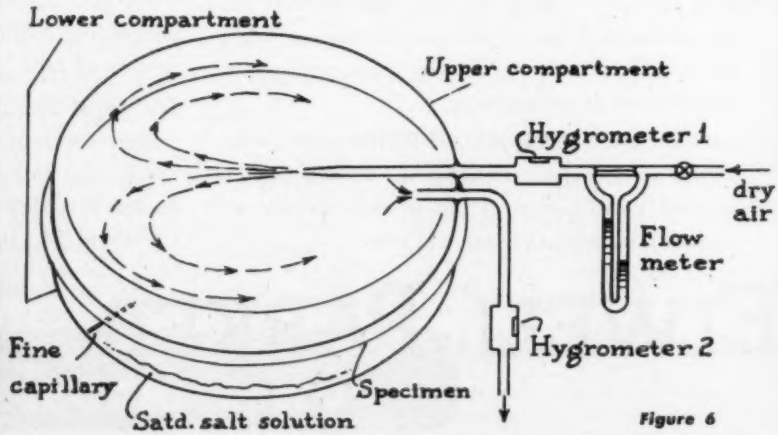

Figure 6

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are separated by the specimen. The lower compartment contains a saturated salt solution, which fixes the relative humidity of the air in contact with the lower side of the specimen at a definite, high value. Dry air, of known initial relative humidity r_i (as determined by hygrometer 1), and of known volume rate of flow (as determined by a calibrated flow meter), enters the upper compartment, as shown. On the assumption that the air in the upper compartment is thoroughly mixed by circulation and turbulence, the air leaving the upper compartment will have a final relative humidity r_f (as determined by hygrometer 2) which can be related to the volume rate of flow of the air, the permeability and area of the specimen, and the initial relative humidity of the entering air.

Evidently there are at least two procedures which could be followed. In one, the volume rate of flow could be set at a suitable standard value, and the increment r_f-r_i in the relative humidity of the streaming air could be measured. This procedure would result in a variable relative humidity differential across the specimen, the differential being smaller for specimens having larger permeability. It would seem to be better practice to adjust the volume rate of flow of the air to obtain a standard value of the final relative humidity, r_f, because the relative humidity differential across the barrier would then be the same for all specimens. The range in volume rate of flow would be very great (corresponding to the large range in permeability of different materials), but this could be easily handled by having two or more calibrated flow meters.

The flow meters should be calibrated at the temperature at which they are to be used. If the flow meters are used at room temperature (and the air is cooled to low temperature by passage through a coil or other heat exchanger), correction should be made for the change in temperature of the air, as well as for the pressure drop occurring at the nozzle. In the latter case, the dry air passed through the flow meter should be sufficiently well desiccated to yield the desired low relative humidity of the air stream entering the upper compartment. In this connection, it should be remembered that, apart from pressure corrections, the partial pressure of the water vapor in the line at room temperature is equal to that of the water vapor entering the apparatus at the low temperature.

As in any other method, an appreciable time may be required for the establishment of equilibrium, and the observations should be made at not too frequent intervals to establish that equilibrium has been attained. If the upper side of the specimen is covered with paper or other hygroscopic material, the time required for equilibrium at 0 Fahr. may be very great.

Literature Cited

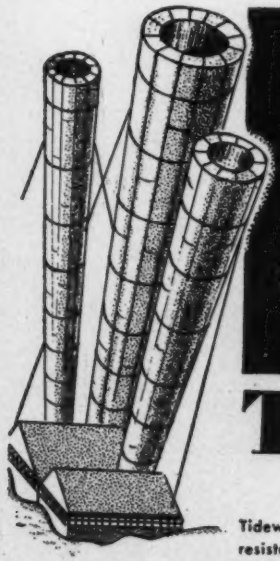
1) The Institute of Paper Chemistry. Penetration of papers by water vapor. Report 30 to the American Paper and Pulp Association. Part I. General discussion of the present status of measurement of water vapor permeability. January 21, 1941. *Paper Trade J.* 116, no. 14:11-15; no. 23:10-13 (April 8, June 10, 1943). Part II. An electric sword hygrometer for measuring the relative humidity of air inside packages or other enclosures. February 8, 1943. *Paper Trade J.* 116, no. 24:16-19; 117, no. 1:12-15 (June 17, July 1, 1943). Part III. Techniques for measuring water-vapor transfer—progress report. February 10, 1943. *Paper Trade J.* 118, no. 2:23-29, 30-31 (January 13, 1944). Part IV. Bibliographic study. February 1, 1944. *Paper Trade J.* 121, no. 13:68, 74, 78, 80, 86, 91; no. 16:33-42 (September 27, October 18, 1945). Part V. Progress report on the development of two new electric methods for the measurement of water-vapor permeability. February 1, 1944. *Paper Trade J.* 122, no. 2:35-44 (January 3, 1946). Part VI. A. Controlled relative humidity cabinet in which specimens may be weighed without removal from the conditioned atmosphere. B. Brief discussion of the measurement of relative humidity. February 15, 1944. *Paper Trade J.* 122, no. 8:41-46 (February 21, 1946). Part VII. Progress report on the further development of a new electric "dynamic" method for the measurement of water-vapor permeability. February 1, 1945. *Paper Trade J.* 122, no 6:37-42 (February 7, 1946).

2) The Institute of Paper Chemistry. Penetration of papers by water vapor. Development of a method for the measurement of water-vapor permeability at low temperatures. Report 30, Part VIII to the American Paper and Pulp Association. February 1, 1947.

3) Dunmore, F. W. Improved electric hygrometer. *J. Research Natl. Bur. Standards* 23, no. 6:701-714 (December, 1939).

4) Abrams, A., and Chilson, W. Vapor transmission through papers. *Paper Trade J.* 91, no. 18:175-180 (October 30, 1930); *Tech. Assoc. Papers* 14:379-384 (1931).

5) Davis, D. W. Isostatic method for determining the gas permeability of sheet materials. *Paper Trade J.* 123, no. 9:33-40 (August 29, 1946).



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The Sandy-Hill-Spencer Dandy Roll Drive

HENRY D. JOHNSTON
Strathmore Paper Company

About ten years ago the Strathmore Paper Company was approached by John Spencer, dandy roll manufacturer of South Hadley Falls, Mass., with a request for permission to make experiments leading toward the development of a method of driving dandy rolls on fourdrinier paper machines. Since we had actively been cooperating with Mr. Spencer in trying to solve some of our own watermarking problems, permission was granted readily and experiments were started.

This objective was not at all new since an inspection of the patent office records will show that over a period of many years practical paper makers have been thinking and working towards a solution of the problem.

As most paper mill men will recognize, the most obvious way of tackling this problem is to devise a means of driving the dandy from the couch roll by means of belts. This was our starting point. It was, of course, necessary to insert some speed changing device between the couch roll and the dandy, in order to provide a means of adjusting the relationship between the surface speeds of these two units and to provide for any desired range in dandy diameters. Such a device was provided and the initial experiments were under way.

PICTURE QUIZ: Which of these five people gives the right reason for buying U.S. Bonds?

(ANSWER BELOW)

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5. Rainy day! "Maybe a rainy day's coming for me. Maybe it isn't. But I am taking no chances. That's why I'm buying all the U. S. Bonds I can through my Payroll Savings Plan."

THE ANSWER

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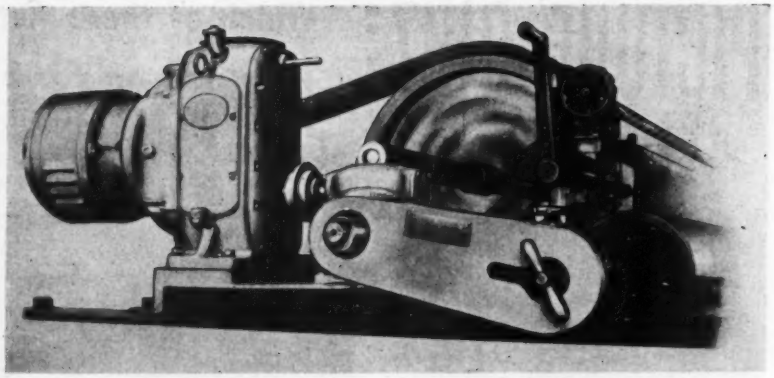

Fig. 1—Sandy Hill Spencer Dandy Roll Drive Installation

It soon became apparent that the use of flat belts would never produce the desired results, therefore, a V-belt system was proposed. This system was carefully designed and installed, and the immediate results gave rise to the hope that Mr. Spencer had really solved a troublesome problem. Upon attempting to duplicate the initial successes, we soon found that the V-belt drive was not the answer if consistent and predictable results were to be secured.

With the failure of the V-belt method of driving dandy rolls, Mr. Spencer turned his attention to the various methods of transmitting power in some manner which would allow absolutely no slippage between the driver and the driven unit. After a study of several possible mechanical connections, it was decided that roller chain drives would probably provide the most practicable way to solve the problem. It was thoroughly recognized, of course, that there would be lubricating problems involved in the use of this type of drive on the wet end of a paper machine.

Keeping in mind the minimum possible interference with the operation of other mechanical elements of the machine, Mr. Spencer then designed and installed a chain drive between the couch roll and the dandy roll. In order to give accurate and dependable adjustment of dandy speeds and to allow for various dandy sizes, a P.I.V. unit provided one step in this transmission.

It seemed desirable to place in this positive mechanical connection some protective device which would permit the dandy roll to run freely or "free-wheel" in the event that the P.I.V. were adjusted to give a lower speed than that of the wire or should there be any mechanical failure in the transmission. To meet this condition an overrunning or free-wheeling clutch was especially designed by a prominent clutch manufacturer. This protection means that at no time can the drive "drag" the dandy.

It soon became apparent that the basic problem of satisfactorily driving a dandy roll had been solved. From a mechanical standpoint we next turned our attention toward the elimination of the collection of shafting, chains, and sprockets which might be expected to provide somewhat of a maintenance problem as time went on. The problem was answered by the development of the electric drive. This step in the refinement of the Spencer drive was accomplished with the co-operation of the General Electric Company, designer of the necessary electrical units.

Mr. Spencer had finally provided for us a positive connection between the couch roll and the dandy roll which provided a definite relationship between the speeds of these two units. Again, the speed changing mechanism selected was the Link-Belt P.I.V. drive.

With the installation of the electric drive, we now had in actual operation a drive which responded instantly to changes in paper machine speeds, and which could be adjusted with a high degree of accuracy to give the machine tender a workable range of dandy roll speeds to meet the conditions of any particular sheet he might be making.

Figure 1 shows how this drive appears on the front side of the machine.

The fact that the Spencer drive was the first drive to achieve these results was recognized by the Patent Offices both in the United States and Canada when they issued to Mr. Spencer, patents covering the driving of a dandy in such a manner "that the peripheral speed of the dandy bears a definite predetermined speed relative to the lineal speed of the wire, the said peripheral speed of the dandy being relatively faster by a few per cent than the lineal speed of the wire and variable accordingly as that of the wire varies."

After making installations of his dandy roll drive in many parts of the country, Mr. Spencer realized, in order to get both national and foreign distribution, licensed the Sandy Hill Iron and Brass Works, of Hudson Falls, New York, as the sole manufacturers and distributors of his drive. We understand that, in addition to taking over the production of drives for "spindle" type dandies, Sandy Hill has designed a drive for the trunnion type of roll.

The results obtained from the operation of this drive went far beyond the goals originally sought.

We discovered that, whereas prior to the installation of the dandy roll drive we had been getting a poor watermark, we were able, after the installation of the drive, to get a very satisfactory mark and at the same time increase the machine speed substantially.

As a result of expanded experiments covering all grades of papers, we found that, in addition to greatly improved watermarks, the increases in paper machine

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speeds ran from 10 per cent to 30 per cent.

A second and equally important unanticipated result came to light with the widened scope of our experiences. We found that not only was improved appearance plainly visible in watermarked sheets, but that even in plain wove sheets the improvement in closing was immediately evident.

In making a grade of paper which gave an entirely satisfactory appearance at 250 fpm., we found that the difference in the appearance of the sheet with or without the dandy being driven was not too great. When, however, we increased this machine speed to from 300 to 350 fpm., we found that it was not possible to make a satisfactorily closed sheet with the dandy roll driving free in the conventional manner, but it was entirely possible to make a satisfactory sheet as long as we drove the dandy.

A further result which became apparent in the course of our experience with this drive was that driving the dandy roll at the proper speed actually causes the sheet to widen to the extent of about three-quarters of 1 per cent.

Into the development of this drive went a great amount of patient and painstaking effort on the part of Harold A. Bolles, our mill superintendent, who took every discouraging failure in his stride and worked diligently with Mr. Spencer to find the answer.

Having reached the point where he knew what to expect every time, we naturally were interested in *why* these remarkable results came about through such a seemingly simple operation.

As a starting point in the attempt to determine the reasons, we decided to determine just what increase in dandy roll speed was actually taking place. The data assembled from a large number of tests showed that the dandy was being driven at a speed as much as 8 per cent faster than when the same dandy was allowed to run "free" in the conventional manner.

Since the magnitude of this differential surprised us considerably, we decided to check the actual peripheral speed of the dandy roll against the actual surface speed of the wire. These measurements gave us only about one half of the differential previously measured between a driven and an undriven dandy roll. It appeared, therefore, when the dandy was not driven there was a measurable slippage between the dandy roll and the wire which sometimes ran as high as 4 per cent.

When the speed of the driven dandy roll was adjusted to give optimum operating conditions, we determined that not only had the normal slippage of a free running dandy roll been overcome, but the driven dandy had been given a "lead" of from 1 per cent to 4 per cent so that the surface speed of the dandy was actually 1 per cent to 4 per cent greater than the speed of the wire.

Our experience has shown that approximately one horsepower is required to drive a 100-inch dandy at 300 fpm.

It may seem to some that a substantial portion of these gains in paper machine speed could well be attributed to normal

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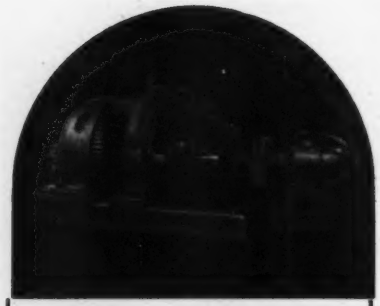

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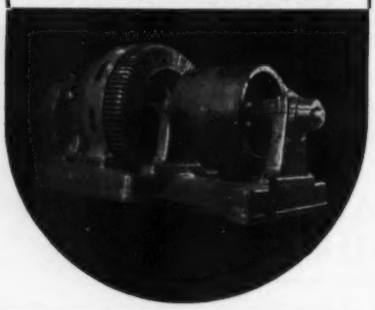

improvements in beating techniques, paper machine changes, changes in furnish, and similar improvements that enter into the day-by-day operation of a paper mill. We have been able to prove conclusively to our own satisfaction, at least, that this is not so.

Probably many fine paper mills have the problem of "localizing" watermarks so that they will appear a reasonably exact distance apart in the finished sheet of paper. Our experience had been that even after exercising the greatest of care in purchasing a dandy roll of the proper diameter, we were still forced to rely on the undesirable practice of adjusting the "draws" between sections to get the required results. With the dandy roll drive, it was possible to secure these results simply by varying the speed of the dandy a very small amount.

It is very difficult to estimate the dollar value of the improvement in the quality of our paper which may be attributed to dandy rolls drives. We do know, however, that the increase in machine speeds alone has yielded sufficient financial returns that we lost no time in equipping every fourdrinier machine in our plants with the Spencer dandy roll drive.

Progress Report on Continuous Refining of High Yield Kraft Pulps at High Temperatures and Alkalinity

D. MANSON SUTHERLAND
Sutherland Refiner Company

Increased yield in sulphite pulps was the subject of a paper delivered by Dr. H. W. Rowley before the Technical Section of the Canadian Pulp and Paper Association in Montreal in January, 1937. Nothing further on high yield sulphite can be added at this time except to say that the commercial yield reached 63 per cent. This high yield pulp was continuously refined at approximately room temperature and no attempt was made to use high temperatures although it was considered to be advantageous.

The use of this process was discontinued when the demand for sulphite pulp caused by World War II induced newsprint mills to turn their excess sulphite capacity over to the production of sales sulphite, i.e., conventional easy bleaching or low yield pulp. Since most mills did not have separate systems for high and low yield sulphites, the low yield was accepted during the war emergency. Despite the savings reported in Dr. Rowley's paper, which have since risen due to increased cost of wood, no further progress in high yield sulphite has been made.

In view of the production experience on high yield sulphite discussions arose regarding the possibilities of applying the use of refiners in production of high yield sulphate pulps. It was thought that advantages might be obtained by refining the pulp directly from the blow tank so as to take advantage of the high temperature and alkalinity.

A test installation was made in a southern kraft mill in 1937. The pulps produced by refining hot and alkaline showed good strength development with practically no drop in freeness or harmful effect upon the operation of the vacuum washers but a decided effect was noticed on all board and paper machines. As soon as the hot refined stock came over to the paper mill it was necessary to back off all jordans because the stock acted slower on the wires.

Unfortunately, difficulties were experienced with tramp metals which severely damaged the stainless steel disks. Owing to mill conditions it was not convenient to install equipment to remove extraneous materials so the tests were abandoned.

Sufficient favorable indications were noted, however, to justify additional tests at a later date. World War II interfered with plans to resume tests and it was not until March 1945 that efforts were renewed in a Canadian Kraft mill producing fourdrinier kraft liners and corrugating board. A paper entitled "Kraft Brown Stock Refining at Bathurst Power and Paper Company," by Gordon F. Allo, was presented before the Technical Section of the Canadian Pulp and Paper Association in Montreal January, 1947, giving actual operating data which will be repeated to some extent, thus bringing this progress report up-to-date.

The only major change in usual pulp mill construction is to install the refiners in the system between the blow tank and the washers. A magnetic separator is installed ahead of the refiners and minor changes in design and operation of the washers may be advisable.

The kraft cook is blown into a vertical "blow" tank equipped with an agitator. The consistency is regulated by the power input to the motor driving the agitator and hot black liquor is used for dilution. Automatic regulation is necessary to control consistency because experience in continuous refining has shown that uniformity of strength and quality is affected by changes in consistency.

Tests made on consistency of brown stock from the blow tank show variations taking place when a blow is entering the blow tank and, particularly, if the tank is three-quarters full.

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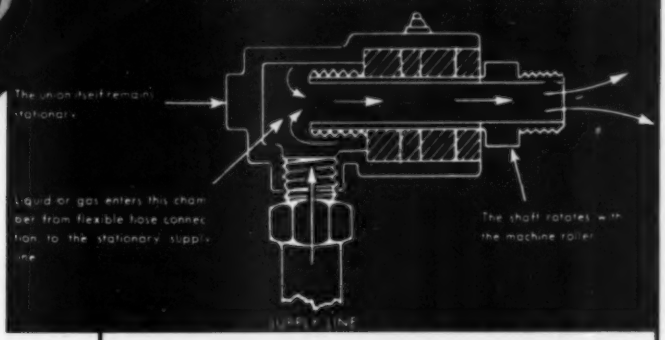
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proximately two-thirds of the way up the bottom cone of the blow tank, consequently a large part of heavy metals fall down to the bottom of the cone and are removed at suitable intervals. A large stationary electromagnet is installed between the blow tank and the refiner supply pump while a large jordan has been used to smash unusually large pieces of partially cooked wood and to act as a further trap for tramp metals.

Recently, changes in the magnet box have been made and weekly inspections show no tramp metal passing into the jordan. There is every reason to believe that the jordan can be eliminated, thus saving 275 hp.

Two single rotating disk refiners, equipped with 42-inch disks, were originally installed; and after six months' operation, one more unit was added to cope with the higher tonnage due to increasing yield. Jordan and refiners are driven by 350 hp., 220-volt synchronous motors at 450 rpm.

Current experience on northern kraft and earlier operations on southern kraft have not revealed any operating difficulties from foaming attributable to hot stock refining although some problem of this sort had been anticipated. Minor modifications in construction and operation of the washers will eliminate any abnormal conditions which may arise.

Either screw presses or rotary washers are satisfactory for use with hot refined stock. Up to the present time, no experience has been gained relative to the use of diffusers for washing high yield stock.

Single disk refiners with 42-inch diameter disks will produce from 80 to 100 tons per day. The temperature of approximately 200 Fahr. necessitates cooling of bearings and elimination of all unnecessary friction.

Refined hot brown kraft pulps have an unusually high Mullen with a high freeness. In order to produce the same Mullen with washed pulp at ordinary room temperatures, it would be necessary to reduce the freeness by approximately 100 cc, i.e., down to 615 cc. Canadian Standard while using much more power than the approximately 2 hp. per ton used with hot, alkaline pulp.

Commercial operations over a period of eight months show an increase of 8 per cent in yield but with additional operating experience, it is confidently expected—based on results of spot tests—that the yield of air dried pulp figured on oven dried wood will be raised from 50 per cent to 65 per cent; the ultimate figure depending on a number of factors including cooking technique and refiner operation.

Cooks averaging 15 C1. No. have been produced and some cooks with a C1. No. of 16.5 have been passed through the hot brown stock refining system without difficulty. This compares to an original C1. No. of 9-11 with an average of about 10. Higher yields have been obtained by reducing the charge of active alkali as Na_2O from 540 lb. to 460 lb. per ton of air dried pulp.

The cooking time has been reduced approximately 15 per cent with consequent reduction in steam consumption per ton of air dried pulp but, as yet, no data on actual savings have been accumulated.

Increased yield due to reduction in chemical charge reduces the load on the recovery plant to a corresponding extent.

The increased yield, smaller chemical charge and shorter cooking time have combined to increase the average pulp production from 210 to 250 air dried tons per day, thereby reducing costs proportionately.

Costs will vary from mill to mill but it is conservatively estimated that the savings will not be less than $4.00 per ton of pulp and even more per ton of board due to improved paper machine operation and reduced steam requirements.

After eight months' continuous operation, disk wear is negligible and it appears that the disks will deliver a uniform quality and quantity for one year or even longer before recutting of the disks will become necessary. The stainless steel disks are thick enough to be regrooved annually for approximately 15 years.

Yields higher than 65 per cent are obtainable by using quick methods of cooking such as in B.K. reaction chambers. Others use neutral Na_2S in rotary or stationary digesters. Open tanks are also used to soften wood chips. In all cases, it is necessary to reduce the softened chips down to small fiber bundles before the

pulp can be further refined. Some installations utilize hammermills and others use single or double rotation attrition mills. The pulp thus made is then passed through jordans before going on the wire. In some mills other fibers such as old kraft containers are added.

The following abridgments are from papers presented at the annual meeting of the Technical Section of the Canadian Pulp and Paper Association, held in Montreal, Quebec, January 29-31, 1947.

Motor Application in the Pulp and Paper Industry

W. L. ELIASON
Electrical Engineer
The Ontario Paper Company, Limited

The selection of motors used generally throughout the paper industry follows a well-defined pattern when based on the electrical and mechanical characteristics as built into the several types by the manufacturers.

Induction motors supply power for the major portion of paper mill equipment and we must not fail to give recognition to the increasing use of the synchronous motor in the field to which it is adapted. Synchronous motors can and are being used in sizes of 100 hp. and larger where surrounding conditions are favorable and the electrical and mechanical characteristics desirable. Some advantages of the synchronous motor over the induction motor are generally higher efficiencies, which is an advantage in large horsepower ratings, constant speed at all loads within the rating, lower starting current in some ratings, unity or leading power factor and, where applicable, this type of motor provides system power factor improvement at a cost usually lower than other methods. The synchronous motor is manufactured generally in two ranges, the low speed range, 500 rpm and below; the high speed range, 500 rpm and above. Since these two ranges of synchronous motors vary with respect to electrical and mechanical characteristics, it is advisable to consult the manufacturer's sales engineer for full details before making final decision.

One other type of motor used to power paper-mill equipment is the direct-current motor. Although this type of motor is not used extensively in the paper industry for other than paper machine drives, winder drives, and supercalender drives, there are several desirable advantages electrically. These advantages can be listed as adjustable speed, speeds from zero to maximum design speed, flexibility of speed, torque characteristics and simplicity of control. These motors are built as shunt-wound, compound-wound, and series-wound; however, the first two types are more generally applied than the third type in the paper industry.

Wood Storage Area

Motors required for heavy duty horizontal or inclined conveyors and adjustable speed conveyors require the wound rotor induction motor either open type, protected type or totally enclosed, depending on the degree of protection to be provided. For light duty horizontal or inclined conveyors, where constant speed is permissible with infrequent starting, the normal or high starting torque squirrel-cage induction motor is suitable with the type of enclosure to be selected depending on degree of protection required. Motors for caterpillar cranes, crane hoists, and equipment of this nature are engineered by the equipment manufacturers.

Wood Room

Motors, in general, are squirrel cage induction motors on constant speed equipment such as conveyors, hand barkers, saws, etc. The drum barkers on the majority of installations are powered by wound rotor induction motors with a reversing feature added in the control to permit rocking the drum when starting under heavy load. The chipper can be either squirrel cage or wound rotor induction motor belted or medium speed synchronous motor direct-connected, depending on the power system capacity. The enclosure selected for any one of the various types of motors will depend on the protection desired to prevent dust, chips, moisture and splashing liquid from entering the motor.

Groundwood Mill

In the groundwood department, the protected type of squirrel cage induction motor is recommended in general for motors located in the grinder room, although special cases may require splash-proof motors. The grinder motors vary in types depending on the power system capacity. The small capacity power system will require the selection of wound rotor induction motors, while the large capacity power systems which are not seriously concerned as to the required motor starting power demand, will allow a choice of motor type. In this latter case the motor selected would be synchronous type, which offers the economies of higher efficiency combined with unity or leading power factor to improve the general mill system power factor. In the screening section of this department where splashing water, water drops, moisture, floods of stock and white water occur frequently, it is undoubtedly a choice between protected type, splashproof type and totally-enclosed fan-cooled type, depending on the conditions surrounding each motor. When making the final selection of this group of motors, the study of standardization of the type or types on the basis of horsepower should be given careful consideration. These motors should have special insulation treatment to resist moisture and any harmful fumes.

Chemical Pulp Department

In this department all motors must have their windings specially treated for moisture, acid or alkaline fumes, or other harmful fumes that may be present. The selection of motors in general would be much the same as in the groundwood department, with the exception that the trend would be to select the splashproof or the totally-enclosed fan-cooled squirrel-cage motor or totally-enclosed wound rotor motors especially for the acid plant, acid coolers, sulphur burners and sulphur melter locations. While sulphur dust in dry locations does not materially affect a specially impregnated winding, it does plug up the air ducts causing excessive heating of motor winding resulting in premature winding burn-out.

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Steam Plant

Selection of the motors for steam plant equipment drives requires a general study of the duties of the different types of apparatus. Protected, totally-enclosed fan-cooled or totally-enclosed squirrel-cage type of motors are recommended for all constant speed drives. The totally-enclosed fan-cooled squirrel-cage induction motor is considered the most economical from the long pull point of view because of the complete protection from dust and minimum maintenance requirement. The protected and totally-enclosed squirrel-cage induction motors can be and are used for this class of drive. However, the protected type requires considerable maintenance while the totally-enclosed type has higher cost than the totally-enclosed fan-cooled type.

The apparatus requiring variable speed drive should use the totally-enclosed wound rotor induction motor. The totally-enclosed frame is necessary to prevent coal dust from causing short circuits in the rotor winding.

In steam plants other than coal-fired, the protected type motor would be generally satisfactory unless explosive fumes are prevalent requiring more complete protection, such as the totally-enclosed fan-cooled or the explosion-proof motors.

Paper Machine Department

The auxiliary equipment necessary to the operation of a paper machine is generally driven at constant speed. The protected type squirrel cage induction motor is recommended for general use. Where more complete protection is required, either the splashproof or the totally-enclosed fan-cooled squirrel-cage induction motor is recommended. These last two types are necessary to protect against excessive moisture, splashing liquids and corrosive fumes.

The paper machine is in practically all cases driven by direct-current motors. These drives are engineered by the motor manufacturers who, from experience, are in the most favorable position to coordinate the necessary data on the drive requirements.

Finishing, Storage and Shipping

These departments do not demand a large amount of motive power for conveyors, cranes, etc. Constant speed equipment would require either the open or protected type squirrel-cage induction motor as these areas are dry and well protected. The cranes and hoists required are usually powered by motors recommended by the equipment manufacturers. These usually take the form of wound-rotor a-c. motors; if powered by d-c. motors, they would usually be series-wound variable speed type.

Motor Controls

The types of a-c. motor starting equipment used generally throughout the paper industry are the across-the-line full voltage automatic starter, reduced voltage starter using auto-transformers either hand or automatic operation, reduced voltage using series resistor automatic starter, reduced voltage using series reactance with either hand or automatic operation, primary and secondary control for wound rotor motors for light duty starting only, heavy duty starting and heavy duty variable speed operation.

Direct-current motor controls are generally enclosed automatic panels using series resistors for starting from a constant potential d-c. bus with provisions for field control of speed above base speed. Some d-c. drives require speed adjustment above and below base speed which is usually accomplished by varying the voltage of an individual d-c. generator for speed below base speed and field control above base speed. In addition to the adjustable generator voltage control, there are two methods known as multivoltage voltage control and resistance control by which speed can be controlled below base speed with field control above base speed if desirable.

The present types of motors and controls may be available for many years, however, it is advisable to keep in mind the possible development of new designs, some of which may be radically different from our present standards. The future of motors and controls is beginning to open up more and more, embracing the new ideas developed during the war as they are being released to the general trade.

Some Observations on Cooking and Acid Making Problems Resulting from Increased Chip Packing

ANDREAS CHRISTENSEN
Supt. Sulphite Mill
Spruce Falls Power and Paper Co., Ltd.

Late in the thirties increasing demand for sulphite pulp required changes to give increased capacity at the Kapuskasing mill. The first plans contemplated addition of two digesters to the existing eight to gain the required production increases. Because of the large capital requirement for buildings and equipment, and because of a space limitation, this plan was not attractive.

In view of other means to gain the production increase the possibility of fuller utilization of the existing eight digesters proved to be more attractive. This decision was based on experience in the associated Wisconsin sulphite mills where it had been possible to increase production without addition of digesters and at the same time to increase quality and to realize attractive reductions of cost.

Our conception of what output may be expected from a digester of a given size changed materially with the introduction of chip distributors, but only a few mills are taking full advantage of this development.

Figures of less than five pounds air dry pulp per cubic foot of digester volume are commonly quoted as representing average conditions within the industry.

With wood of an average specific gravity of .420, it has been possible to increase the output per unit volume of digester space in this mill from an average figure of 4.7 pounds air dry pulp per cubic foot to the present value of 6.4 pounds.

The prior experience in the Wisconsin mills indicated that there is a logical sequence of equipment change necessary to make a smooth transition to these improved operating methods.

This program starts with changes required to the acid plant and recovery system to insure uniform cooking acid concentration, free and combined under all seasonal changes.

As a second step gains of the order of 15 per cent increased digester yield may be realized by chip distribution alone, without forced digester circulation, and with some lowering of steam and chemical costs.

The third step, provision of forced circulation and external heating, permits use of full automatic cooking control and material extension of use of the chip distributor.

A local condition at the Kapuskasing mill where the blow pipes rise nearly vertically to a height of 24 feet above the blow valve required that auxiliary means be added to enable clean blowing at the increased consistency resulting with increased output.

The primary function of the acid plant is to produce during 12 months of the year a cooking acid of a predetermined concentration, under our operating conditions not less than 6.8 per cent total SO_2 by weight at a temperature of about 80 deg. C. and in sufficient volume to meet digester requirements.

Following is a brief description of the existing equipment:

Sulphur is burned in two rotary burners with combustion chambers consisting in part of one cylindrical tank with central overpass baffle for each burner followed in each case by a series of pipe bends with plastic fire brick lining to insure sufficient retention and turbulence to complete combustion. The sulphur is fed to the burners in molten form and the sulphur level in each burner is automatically controlled. Each sulphur burning unit is equipped with recording SO_2 analyzers.

Existing sulphur melters which are poorly designed are now being replaced with steam-jacketed tubular melters and facilities for removing dirt between melters and molten sulphur storage will also be provided.

Direct contact spray burner gas coolers are in the process of installation. Each unit consists of a primary cooling tower which has a ceramic lining and a secondary packed cooling tower with all parts in contact with SO_2 gas being made from C.N.I.

Bulk lime for preparation of milk of lime used in the Paulson system is unloaded directly from cars into slacking bins each with a capacity of one-half carload. This system has advantages over use of the more usual small batch slackers; but better means are now available and we hope to replace this installation with a modern storage silo and continuous slacker.

The absorption of SO_2 burner gas in the milk of lime solution takes place in two Paulson 5-compartment systems. Each unit forms an independent acid making system.

In preparation for the production increases in 1945 means were developed for imposing pressure on the acid during the last stages of its preparation, following the principle established by R. B. Wolf in 1916. This system takes advantage of the principle that the true free SO_2 content of the raw acid can be increased by increase of pressure. The choice was made largely on the results with operation of a complete Paulson acid system under pressure at the Kimberly, Wisconsin, mill.

To maintain average temperature of approximately 80 deg. C. in the finished cooking acid under winter conditions, hot water is used to mix lime water when river temperature is low.

Weak acid from tail gas tower is used for makeup in the intermediate compartments of the Paulson systems.

The recovery system is designed to recover both heat and chemicals from the digester relief and to maintain a cooking acid of uniform strength and temperature.

Briefly, the system consists of one high pressure accumulator and one low pressure accumulator, one reclaimer tower, for digester relief operated at 10-lb. pressure, one recovery tower, for overgas operated at atmospheric pressure, as well as a tail gas tower to remove the last traces of SO_2 by scrubbing with water before inert gases are discharged to atmosphere.

The raw acid enters the system from two storage tanks located outdoors and passes through the overgas recovery tower, and is pumped to the low pressure accumulator. The next step in the recovery process is that of pumping acid from the low pressure accumulator to the top of the reclaimer tower.

Digester relief is passed through the heat exchanger and the temperature is reduced to a point where substantially complete absorption is accomplished in

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reclaimer tower, at 10-lb. pressure. The relief gas, after cooling, enters the tower near the bottom and the fortified acid is pumped from the bottom of the tower through heat exchanger and delivered to the high pressure accumulator where the finished cooking acid is stored under 50-lb. pressure.

The recovery and the tail gas towers existed prior to this development period. They constitute the so-called Independent recovery system which serves to free burner operation from the recovery system.

The advantage of relieving a digester, particularly during the blowdown period against a constant pressure of not over 10 lb. is quite obvious from the standpoint of better recovery. It also affords an opportunity to increase accumulator pressure to prevent flashing off of gas at increased temperatures without affecting digester operation. Instrumentation has been carried out in the recovery system to a point where the operation is practically automatic.

On the planning of the circulation systems particular attention was paid to the design and location of the strainer. With maximum packing of the digester the buoyancy of the chips in the early part of the cook requires streamlining of the strainer and close mounting to digester wall to prevent damage to this equipment.

External heating of the digester permits instrumentation which in turn gives duplication from cook to cook and exact temperature control within the digester.

The problem of blowing the digesters was intensified with increased packing in that acid volume was reduced and steam used per cook dropped materially with the result that pulp density in the digester increased.

Digesters that did not blow clean required washing down of the remaining pulp and reblowing and this in turn would not only upset the cooking cycle but also waste considerable steam as well as disrupt the acid making operation. To remedy this condition, a system was installed that would spray recovered waste liquid into the bottom of the digester towards the end of the blow.

This system which was made a part of an existing waste liquor heat recovery system is referred to as a flushing system. Withdrawal of waste liquor from the heat recovery system for this purpose did not reduce the efficiency of the system as the liquor would again be recoverable from the blowpits. Installation of the flushing system has practically eliminated reblows and made it possible to operate on a fixed cooking cycle This is of vital importance to insure a uniformly high production and also guarantee stable operation in the acid plant. The plan was adapted from an article describing a similar installation developed at one of the Price Brothers mills (*Pulp & Paper Magazine of Canada*, February 1940).

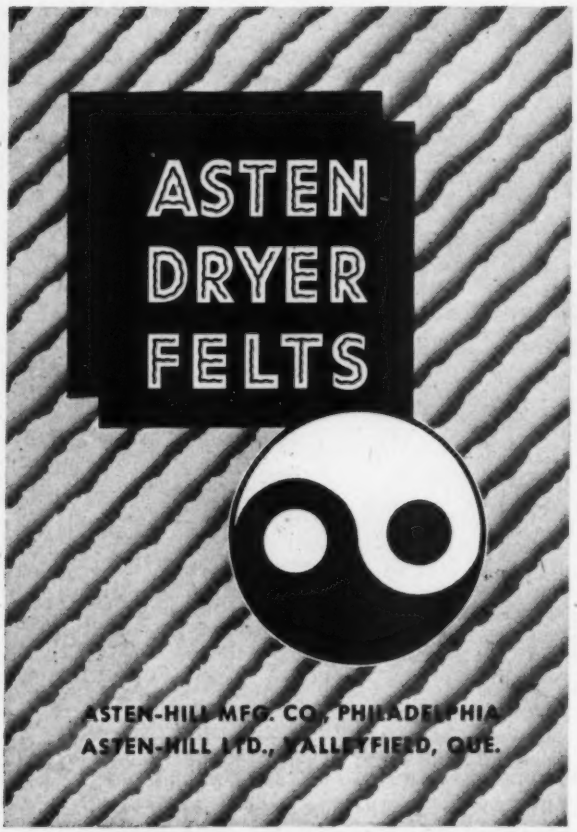
Automatic control of steaming and relieving of the digesters has made it possible to standardize the cooking process and produce pulp from cook to cook with only slight variation in bleach demand.

Except in rare instances, where the liquor tests and time temperature history may have been abnormal, the final blow down and the blowing operations are carried out purely on a time schedule. Variations in wood type and condition remain as variables and they are compensated by change of maximum temperature. On practice these wood changes result in progressive changes in bleachability of successive cooks. When a firm tendency has become evident the maximum temperature setting of the time cycle temperature instruments are changed to keep bleachability tests within the standard ranges. This philosophy of repeating temperature rise, withdrawing side relief and making the final blow down on definite time schedules increases production and gives a more uniform product than can be obtained where an attempt is made to use judgment factors. Instrumentation does not subtract from the cook's responsibility. It does give him a new tool that enables him to do a better job.

Evaluation of Stock Preparation Equipment

C. H. VICKERY
E. D. Jones & Sons Co.

The purpose of this paper is to suggest a method for evaluating stock preparation equipment so that the existing confusion regarding its selection, application, and comparison might be overcome. Many



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makes and types of equipment are available, but there is no sound basis for comparing or evaluating them.

The idea we propose is that stock preparation equipment be selected and evaluated on a strictly mechanical basis.

Every machine used for preparing fiber has five basic mechanical characteristics, which, when known, will describe quite accurately the type and amount of work it will perform and the efficiency with which it is achieved.

With the mechanical data pertaining to a machine, and an understanding of it, the papermaker has a sound basis on which to build his stock preparation, and the reasons for it.

The five interdependent and basic mechanical factors existent in varying amounts in all stock preparation equipment are:

1. Inch cuts or inch bar strokes or impact inches per minute.

2. Total square inches per minute or the so-called wet beating area, expressed as a fraction of the inch cuts.

3. Maximum available contact pressure per unit of contact area, computed with the rotor at rest or running at correct speed.

4. Surface speed of rotating element, which may be expressed in feet per minute.

5. Horsepower required with its distribution between circulating power and power used effectively for treating stock. Circulating power includes drive and motor losses.

These first three factors must be considered as a group because they are inseparably tied together and any consideration of one without the others is a waste of time.

We are not saying anything in particular about bar thicknesses because they are the tools with which are worked out the desired combinations of the three factors. Individual bar thicknesses have no value in evaluation.

A small contacting area resulting in high contact pressure will give cutting inch bar strokes. A large contacting area with low contact pressure will give mostly hydrating inch bar strokes. There are innumerable combinations in between and any percentages of the desired mechanical characteristics can be worked out.

Factor number four, relating to surface speeds, is of value because it has a bearing on the kind of work done as well as the efficiency with which it is done. Generally medium or low surface speeds are conducive to cutting, provided consistencies are kept low, with the higher speeds tending to cut less and produce good fiber bundle separation, fibrillation or hydration. Much more information is needed regarding the value or lack of it in high surface speeds. General observation, and again guesswork, leads to the belief that no advantage is secured commensurate with the increase in power consumption.

Factor number five is of great importance because it puts the finger on the efficiency with which a machine converts the power input into work on the fiber. A machine converting 75 to 85 per cent of its power into actual work on fiber is a better bet than one in which the efficiency may be 30, 40, or 50 per cent.

In Table I following, are compared two machines representing extremes in stock preparation. Machine "A" is typical of a machine for treating cotton fiber in preparation for an all rag index sheet. What is required here is purely cutting with the preservation of a free fiber. "B" is typical of a machine for preparing sul-

Table 1

Inch Cuts per min.	Sq. in. per min. or Wet Beating Factors	Max. net Momentary Contact press. psi (pounds)	Surface Speed (fpm)	Power (hp.)		
				Circulating	Useful	Total
Machine "A" 80,000,000	1,250,000 or 1/64	580	2200	40	160	200
Machine "B" 10,000,000	10,000,000 or 1/1	50	2200	35	120	155

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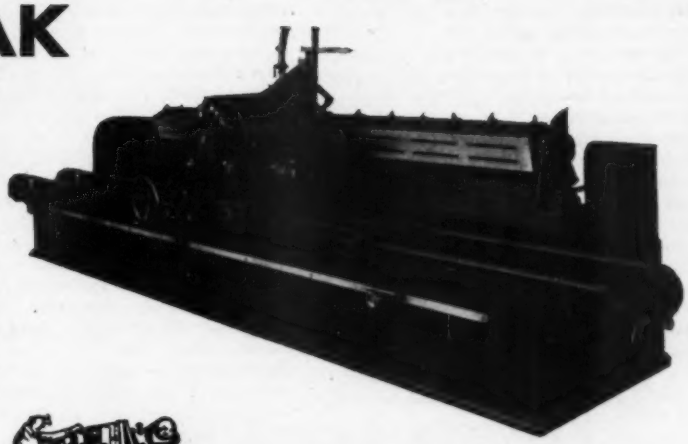

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phite to form a glassine paper. What is required here is extreme hydration with the entrapment of water within the fiber.

Note that the contact pressure is computed with the rotor at rest. This method is satisfactory as long as machines with equivalent surface speeds are being compared.

Now that we know the mechanical characteristics required in the equipment to treat many types of paper, how do we go about the application of the necessary amount of stock preparation equipment for the production of, let us say, 1000 pounds per hour of the same type of a'l rag index sheet? It is known, from actual experience, that each pound of furnish must be treated by 4,000,000 inch cuts. By a simple calculation

$$\frac{4{,}000{,}000 \times 1000}{80{,}000{,}000} = 50 \text{ minutes}$$

it is shown that "A" 80,000,000 machine will prepare 1000 pounds of stock each 50 minutes.

All types of stock treatment could be worked out on this basis, and as experience and study advances with such a program, much of the apparent mystery in stock preparation could be eliminated.

The machine evaluation in the first table would be of great value in comparing competitive makes and types of equipment, and Table 2 illustrates the adaptation for this phase of the evaluation.

Note that the contact pressure in Table 2 is secured by dividing the weight or thrust of the rotor by the total accumulated square inches per minute at full speed. Thus we compensate for the difference in surface speeds because the weight or thrust is distributed over greater areas at higher speeds, reducing the pressure per square inch, and vice versa.

The thrust of the rotor in "C" has been assumed to be 1000 lb., as no actual data is available. This end thrust, transposed to the cone of the shell, gives about 6000 lb. to be distributed on the wet beating area. With only 50 hp. available for setting up the rotor, our assumption is probably about right. If the wet beating area were reduced and the bar pressure increased to correspond to "D," much more power would thus be required than is indicated by the table.

Machine "C" circulates 1000 gallons per minute of 4 per cent stock and "D" circulates 1000 gallons per minute at 5 per cent.

These machines might both be recommended by different manufacturers as examples of ideal equipment to prepare sulphite bond. We would favor machine "D" because it gives the contact pressures known to be necessary to treat this material and because the power efficiency is very much better than machine "C." It is doubtful if "C" could be set up enough to do the work required because of the low maximum contact pressure and the too-great contacting areas.

Manufacturers have a great field for development in bar patterns and arrangements and in the spacings and transporting areas. With all the changes that are known to be on the way some method of evaluation will become a necessity.

We hope to see the day when papermakers will demand that all specifications covering proposed stock preparation equipment will incorporate the five basic mechanical factors.

Table 2

Inch Cuts per min.	Sq. in. per min. or Wet Beating Factors	Max. contact press. per accumulated sq. in. (pounds)	Surface Speed (f. m)	Power (hp.)		
				Circulating	Useful	Total
Machine "C" 80,000,000	20,000 000 or 1/4	.0003	6000	100	50	150
Machine "D" 80,000,000	5,000,000 or 1/16	.0037	2200	35	115	150

Paper Machine Maintenance*

E. D. BEACHLER
Asst. Chief Engineer
Beloit Iron Works

In designing a machine we attempt to have the various parts made so they can be serviced as easily as possible. By making the various parts easy to get at and inspect, the amount of maintenance time can be reduced materially. This will eliminate the necessity for extended shutdown periods for servicing the various items on a paper machine.

In attempting to reduce this shutdown time, a number of parts have been made so they can be serviced while the machine is in operation. As an example, with the high speed steam fit it has been necessary to have the machine out of operation for a period in order to change the carbons and sylphons used with this type of steam fit. A new design is available which will permit replacing carbons or sylphons with the machine in operation. The only lost production would be due to shutting the one dryer off on which work is being done. In the end this will mean that a good deal of time will be saved in servicing this one particular item. We all know carbons will wear ultimately and have to be resurfaced or replaced.

In order to properly protect the numerous antifriction bearings which are required on a high speed machine, it has been necessary to go to complete enclosures with numerous seals. These enclosures are used on most of the main items on a paper machine including antifriction bearings, shake units, enclosed gear units, the enclosed dryer section drive, and practically all of the parts on the machine which either rotate or oscillate during machine operation. This projection means that a particular part is not normally subject to failure from corrosion, water or dirt from the paper machine operation, but it also means that the particular part is not open for easy inspection under most conditions.

For that reason the men taking care of the maintenance of paper machines should be of the type who are interested in knowing what is behind the enclosures as well as being able to diagnose any trouble as it may start. As machine builders we are glad to provide any data necessary on particular parts so that adequate information is available for servicing. During operation if necessary corrections are made as soon as trouble is apparent, the failure will be minimized and can often be corrected before any lost time is occasioned for the paper machine.

In order to obtain the best use of preventative inspection, it is suggested that a system be set up so data can be accumulated on the operation of each major unit in the paper machine along with any history of maintenance in the machine life. To accomplish this end, it is suggested that each machine be assigned a number and each part a sub number which can be recorded on a series of index cards or its equivalent. This will allow the identification and recording of each major item of maintenance as it occurs. In cases of excessive maintenance, it is always better to replace the unit completely or to change its design to prevent recurrence of trouble.

In some cases maintenance can be set up periodically during the year, say once, twice or three times a year, in which a major amount of work can be done. This can include any necessary repairing, any roll grinding required, as well as inspection of major bearings with any replacement necessary. Particularly in the case of periodic roll grinding, excellent results can be obtained since a roll which is maintained in good condition will not be subject to excessive marking.

One of the most important items to reduce maintenance is to insure that the highest grade of lubricant is used throughout the machine. It is very good insurance to use only the best lubricant because of the fact that the price difference between the cheapest and the most expensive is so small that the difference is more than repaid if any failure is prevented.

In designing paper machinery, we have attempted to adjust bearing constructions so that the number of lubricants required for various applications can be reduced. In reducing the number required for a machine, it will be easier for the lubrication man to stock the right lubricants and to make sure that the right one is used in each place. We use a grease of the lime base type for all grease lubricated bearings on the wet end of the machine. Where dripping from the housing is to be eliminated on the dry end of the machine, a soda base type of grease is used. For all oil lubricated bearings the best grade of mineral cylinder oil of a viscosity suitable for the operating conditions of the particular bearing is used. In most cases this is an oil with a viscosity of 600 seconds at 100 Fahr. There are requirements for a special mild inactive type of EP lubricant where hypoid gears are used. There is a requirement for a steam cylinder type of oil for worm gears. There is a lubricant of the mineral cylinder oil type needed for moccasin bushings and, in some cases, for the wet end lubrication system where it is extremely important that water can be easily removed from the oil. This oil has a viscosity of 150 to 200 seconds at 100 Fahr.

In lubricating a machine, it is important to see that it is done systematically and that each bearing and gear unit be taken care of at its required period throughout the year. Normally bearings which would require lubrication approximately every two weeks are put in one period. The next period would be every month, every three months, every six months, and last once a year.

By giving the lubrication man a simple set of cards for him to follow he can be assured of not overlooking any particular application as its period occurs during the year. These cards covering each bearing application can include the type of lubricant required as well as any special lubrication instructions applying to the particular part. It gives Management a check to make sure that all the bearings have been properly lubricated as required throughout the year. After lubrication is completed for each period, the cards are checked and any unusual condition noted on them by the lubrication man. This can serve as a guide for future maintenance requirements.

The lubrication of antifriction dryer bearings is one of the most difficult lubrication problems in the industry. The actual lubricating system equipment should be of the best type available since these bearings are operating at high temperatures in the presence of moisture due to condensation and high humidity in the dryer section. To properly maintain the

(Turn to page 136)

(*) Abridgment of paper presented at the TAPPI Engineering Conference held in Milwaukee, Wis., October 2-4, 1946.

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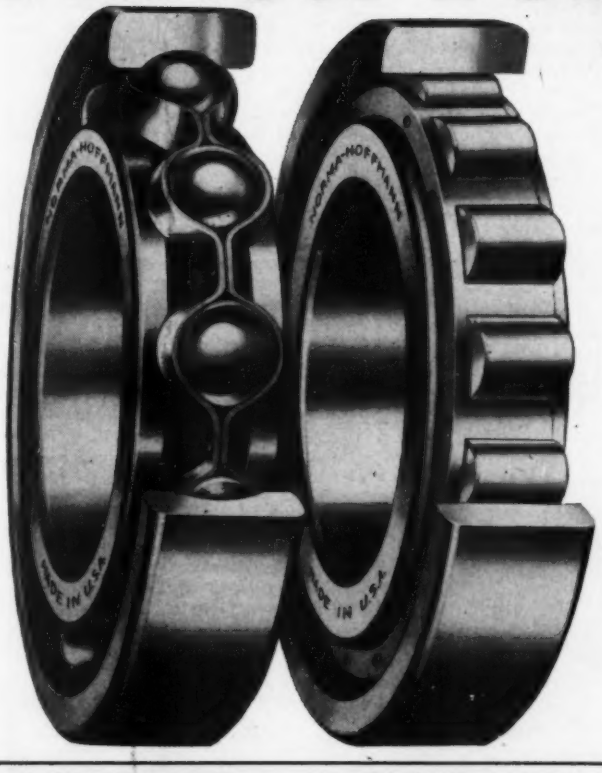

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NEW EQUIPMENT AND SUPPLIES

Wood Pulp Knotter

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced the *Low-Head* knotter for the removal of rejects ahead of the fine screening operation. The knotter, designed for high capacity on a wide range of paper pulps, is available in high tensile steel, plastic coated high tensile steel, and stainless steel models to meet non-corrosive, corrosive, and highly corrosive conditions. A long screen deck permits the use of closely controlled adjustable sprays. According to the manufacturer, this feature results in a cleaner pulp and for most pulps a fiber loss of less than one pound per ton of feed. The deck also is open, thus making the knotting operation visible at all times.

Two-Wheel Roll Grinder

Farrel-Birmingham Company, Inc., Ansonsia, Conn., has announced a new design of paper mill roll grinder that features two grinding wheels of large diameter. The wheelhead design permits the exchange of wheels without disturbing either the spindles or the bearings.

The spindles are of large diameter; the bearings, babbitt-lined, steel sleeves, with adjustments for the control of running clearance.

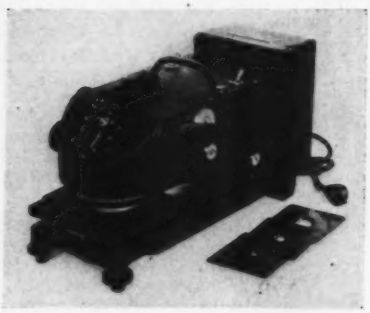
The carriage is driven by a large diameter nut engaging in a traverse screw in the center of the bed. An adjustable variable voltage motor with electronic control provides stepless, wide-range speed regulation.

The headstock and wheel motors and controls are of dc characteristics, providing four to one speed variations for the headstock drive and two to one on the grinding wheels. The carriage traverse speed variation of approximately 20 to one is accomplished by an electronically-controlled drive unit taking its power from alternating current supply.

Standard design features of the grinder include the Farrel patented crowning device. Lubrication is by a separate motor-driven pump.

Air Permeability Tester

A testing device, designated as the Gurley Permeometer, has been announced by W. and L. E. Gurley, Troy, N. Y., for use in measuring the air permeability of very porous papers and of such other materials as woolen and cotton felts and other fabrics used in paper mills.



The instrument operates as a pneumatic bridge. Its use for measuring air permeability is analagous to the use of a Wheatstone bridge for measuring electrical resistance.

A suction fan exhausts air from a reservoir, the suction in the reservoir being maintained by a gravity-actuated relief valve at 10 in. of water.

Air is drawn from the atmosphere through two parallel chambers into the reservoir. In one of these chambers, the reference chamber, a suction of 0.5 in. of water is maintained by standard inlet and outlet orifices. In the other, the test chamber, the suction is determined by the sample under test (held in clamping rings) and by a calibrated flow meter valve.

The flow meter valve, operated by turning a micrometer head, is adjusted until the suction in the test chamber balances the suction in the reference chamber, as indicated by zero reading of the vane in a variometer connecting the two chambers. The valve reading is then a measure of the air permeability of the sample. Any remaining slight variations of the low pressure source are reflected equally and simultaneously in the two chambers, with a final result that no valve adjustment need be made to maintain a null reading on the variometer.

A guard ring (a groove in the upper clamping ring) is connected through a needle valve to the reservoir, and, through a 3-way valve, to the variometer and reference chamber. Adjustment of the needle valve balances the suction in the guard ring. This eliminates from the measurement any air that is drawn across the surface of a rough sample, and makes excessive clamping pressure unnecessary.

The micrometer valve reading can be converted into air permeability by reference to a calibration curve or table.

Tests can be made very rapidly with the instrument. A routine test can be made in not more than 15 seconds.

The instrument, equipped with universal motor which operates on either dc or ac current, will measure air permeability of materials which pass from one to 400 cu. ft. of air per minute per square foot at a pressure drop of 0.5 in. of water. Materials, up to 5/16 in. thick and not less than three inches in diameter, may be tested. Large samples may be tested without cutting, as the throat is six inches deep and large enough to admit considerable material.

Quick Opening Gate Valve

D. J. Murray Manufacturing Co., Wausau, Wisconsin, has announced a quick-opening, pulp and paper stock valve which is made in all cast iron, cast iron with bronze gate, or all bronze. The valve is designed so that it is narrow from face to face of flanges to permit installation where space is limited.

Also, it is designed to permit removal of the gate without disconnecting the valve from the pipe line. The valve is made in 6, 8, 10, 12, and 16 inch sizes.

Gauge for Measuring Thickness Of Pipes from Outside

A gauge designed to measure the thickness of iron or steel pipes from the outside has been announced by the Special Products Division, General Electric Company, Schenectady, N. Y. Designated as a pipe thickness gauge, Type MS-A, the instrument can be used on pipes up to

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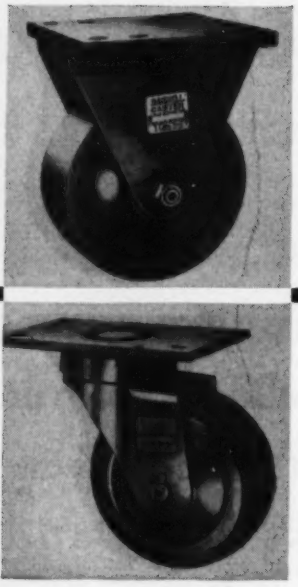

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¼ inch in thickness and from one to two inches in diameter.

The gauge consists of an indicating instrument, a gauge head, and a saddle which is connected to the gauge head by two screws. A different saddle is required for each diameter of pipe. To operate, the saddle is placed upon the pipe, and thickness is indicated in fractions of an inch on the indicating instrument.

The gauge measures the average thickness of a pipe over an area of several square inches. Accuracy of plus or minus 1/64 in. can be obtained on clean surfaces, and 1/32 in. on dirty surfaces. Dirt, scale, and paint on the inside of a pipe do not add to the thickness reading.

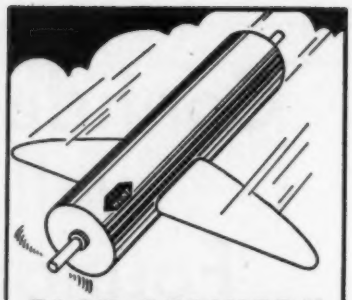
The gauge head and saddle combination weighs about 6½ lb. The instrument operates on 115 volt, 60 cycle power.

Recording Tachometer

An electronic recording, indicating and controlling tachometer, especially suited for rotating machinery in the process industries, has been developed by Bailey Meter Company, 1050 Ivanhoe Road,

Cleveland 10, Ohio. This tachometer consists of a heavy duty magneto generator and a standard Bailey electronic recorder arrangement.

The generator may be connected to a roller or shaft, either directly or by means of a V-belt or sprocket and chain drive.



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The recorder, calibrated to record in rpm or fpm or both, is connected electrically and can be placed in any convenient location. A step-up drive is used if the maximum speed to be measured is less than 100 rpm; the maximum chart reading is 2000 rpm.

Process for Cutting Stainless And Alloy Steels

Arcos Corporation, 1515 Locust St., Philadelphia 2, Pa., has developed a method for hand cutting or piercing stainless and stainless clad, alloy steel, aluminum, bronzes and brasses, cast iron, Monel, Inconel and nickel. The process, known as the *Arcos Oxyarc* Process, achieves the cutting by the combination of an electric arc and a stream of oxygen. The equipment, which can be used wherever an ac or dc welder and bottled oxygen are available, consists of a specially designed holder and a tubular coated rod which is consumed in the process of cutting.

Line of Stainless-Clad Steels

A complete line of stainless-clad steels has been announced by Lukens Steel Company, Coatesville, Pa. Stainless steels of types 304, 316, 347, 410, and 430 are the cladding materials generally used. Specifications of both the stainless and the backing plate may be widely varied to meet chemical and physical requirements. Plates are furnished in thicknesses of from 3/16 inch to over 3 inches and in widths up to 162 inches; heads, in all styles and sizes to over 18 ft. in diameter.

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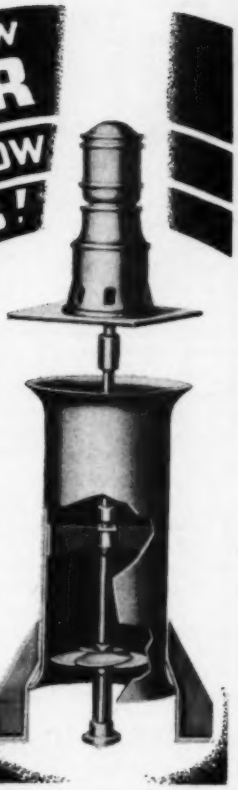

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TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in the American and foreign press.

Evaporation and Combustion of Sulphite Waste Liquor

Evaporation equipment at Hörnefors in Sweden is described and test data and operating results are given. Incrustation problems at various plants are also discussed, and a brief reference is made to new and improved methods of pressure heating of sulphite waste liquor. However, owing to pending patents, details are not included.

A feature in the pressure heating is that considerable amounts of lime are deposited in sludge form. This no longer forms deposits on the heating surfaces. Torsten Ramen. Svensk Papperstidn. 49, No. 18, 418-22 (1946). Through B.I.P.C. 17, No. 6, 316 (1947) (Original article in Swedish with English and German summaries).

Experiments in Folding Endurance

Details are given for the preparation of paper sample strips that are to be used in determining folding endurance. From a sheet 100 by 150 mm. are cut ten strips, each of which is 15 by 100 mm., and these are all used in the tests. Papers are classified in accordance with the number of double folds. Henri Lhomme. *Papeterie* 68, No. 1, 5-6 (1946) (in French).

Pulps from Shavings Obtained in Barking Spruce

The high losses in wood resulting from knife-barking caused the author to make a detailed study of the utilization of waste shavings. These consisted largely of sapwood, together with the cambial layer and about 15-18% bast. The shavings were cooked 26 hours at a maximum temperature of 128 degrees by the sulphite process, using a liquor containing 3.4% SO_2 and 1% lime.

When the resulting pulp was Jokro-milled for 25 minutes, breaking lengths up to 6800 meters and a folding endurance of 250 double folds were obtained. When, however, the inner bark (i.e., the bast) was removed and cooked separately, a half-stuff was isolated, which, when disintegrated with a Schopper Propeller, reached 75 degrees Schopper-Riegler within 10 minutes and gave a greaseproof sheet having a breaking length of 4500 meters and zero double folds. When beaten in a Jokro mill to 81 degrees Schopper-Riegler, this same bast pulp showed a breaking length of 5,200 m. and zero fold, and the relatively high copper number of 5.1.

Attempts were made to reduce the digestion period of the wood waste shavings to 14 hr. at 136 degrees, but the resulting pulp was less satisfactory, showing a maximum breaking length of 6,060 m. and 90 double folds. When the cooking schedule was changed further to 17 hr. at 136 degrees, the maximum breaking length was 6,850 with 210 double folds. When the bast alone was cooked 17 hr. at 136 degrees, the maximum breaking length of the product was 5,310 m. and the double folds were only 3. Far stronger pulps from both the total shavings and from the bast alone were obtained with 4.5 hr. kraft cooks, using a maximum temperature of 160 degrees and a cooking liquor containing 46 g. NaOH, 20 g. Na_2CO_3 and 14 g. Na_2S per liter. The pulp obtained from the wood waste showed a breaking length of 7,400 m. and a folding endurance of 520. The pulp made from bast had a breaking length of 8,000 m. and showed 900 double folds. Some orienting extraction experiments were also carried out. Thus the bast cells contained about 41 per cent hot water soluble material removed by heating under pressure; these appeared to contain tannins. Otto Wurz. Textil-Rundschau 1, No. 6, 174-8 (1946) (in German).

Utilization of Peat

The peat deposits of Canada gave rise to an extensive research on the uses and economic value of peat. The possibility of applying peat in plastics, chemicals, absorbents, building materials, insulation and rubber is described. Despite the fire hazard, peat can be used provided it has been made fireproof, which can be done at relatively low cost. By adding other cheap materials, the author attempted to make building board from peat. Asbestos tailings and peat seemed to furnish the best of such cheap boards. Small amounts of phenol-formaldehyhe resin served as a bonding material. The board showed very low water absorption and was fireproof, and other properties could be developed by the addition of plasticizers. C. W. Davis. Can. Chem. Process Inds. 30, No. 12, 86 and 89 (1946).

Wallboard and Groundwood Industrial Laboratories in Sweden

The laboratories of the Swedish Wood Research Institute are described. These laboratories are built on a semicommercial scale and occupy a separate building that is adjacent to the papermachine room. The laboratories are administered and equipped by branch organizations of the respective industries, but they operate jointly under one head.

In the wallboard department, fiber is produced by an Asplund defibrator which can produce 100 kg. per hr. Refiners, screens and dewatering equipment are described. Any section of the laboratory can be equipped with other types of machinery when special experiments are required. Four good-sized stock chests and one white water tank provide freedom in the selection of a suitable flow system. The fiberboard is produced by a four-drinier 650 mm. wide, fully equipped with deckles, suction boxes, multiple presses, and cutter. The board may be dried on a Fläkt dryer or heat-pressed so as to yield a hard board. The groundwood pulp is produced by means of a specially designed laboratory grinder driven by a 100 kw. direct-current motor at 400-690 rpm.

The pulpstone has a diameter of 750 mm. and is 350 mm. wide. Grinding pressure is regulated by exchangeable weights suspended on wires over a system of pulleys. For coarse screening, a Jönsson vibrating screen is used. After fine screening on a centrifugal screen (with rejects passing over a flat screen), the pulp is passed to a wet machine. Other parts of the laboratories are described and numerous diagrams are included. Otto Brauns. Svensk Papperstidn. 49, No. 22, 515-30 (1946) through B.I.P.C. 17, No. 6, 312 (1947) (The original is in Swedish with German and English summaries).

An Acrylic Contact Laminate

Recently there has been produced a post-formable polyester impregnated fabric containing color and design that is laminated to a clear acrylic sheet. The material can be formed with standard dyes, and polyester-impregnated paper can be used in the place of cloth. The material can be used flat or it can be bent. Uses are described. Anon. Modern Plastics 24, No. 2, 122-3 (1946).

Treatment of Sulphite Waste Liquors on Trickling Filters

The authors summarize work done on the biochemical treatment of sulphite waste liquor and emphasize the trickling filter system. The determination of the type of organism that is used in seeding their filters is discussed, and the filters are described. The effect of this treatment was gauged by the following tests: biological oxygen demand, sugar, permanganate number, the total and volatile solids, as well as other occasional tests.

Because sulphur dioxide has an inhibiting effect on the growth of filter flora, all liquor was stripped of this gas before being introduced to the filters. Steam stripping appears to be the most successful of the stripping methods used, and is described. Whereas filters at *p*H 7 are more effective in removing sugars, they are somewhat more expensive to operate than are filters at *p*H 3. The filters are sensitive to temperature changes and the activity of the micro-organisms decreased rapidly when the temperature fell below 22 deg. C. and there seemed to be little advantage of operating above 25 degrees although the data at these higher temperatures are too meager to warrant definite conclusions. Two-stage operations appear to result in but little advantage over the single stage filter. Tables and graphs are included. Richard G. Tyler, William Maske, and Robert Brewer. Sewage Works J. 18, No. 6, 1155-68 (1946) through B.I.P.C. 17, No. 5, 266 (1947).

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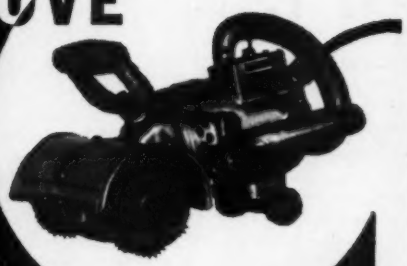

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PAPERMAKING PATENTS

IN THE UNITED STATES—Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington 4, D. C.

Coated Paper and Method of Making Same

Patent No. 2,402,542. Chauncey P. Foote, Jr., Yonkers, and Clifford D. Guertin, St. George, Staten Island, N. Y., assignors to American Bank Note Company, New York, N. Y., a corporation of New York. No Drawing. Application April 22, 1943, Serial No. 484,126. 15 Claims. (Cl. 117-1.)

1. As an article of manufacture, a sheet of water absorbent paper coated with a coating consisting of a water soluble binder and calcium carbonate and tartaric acid held by the binder in reactive relationship whereby the coating may be destroyed by dipping the coated sheet in water.

Method of and Apparatus For Producing a Head in Response to the Consistency Of Papermaking Stock

Patent No. 2,403,827. Ernest Poirier, Waterville, Maine. Application September 9, 1942, Serial No. 457,715. 11 Claims. (Cl. 137—78.)

1. That improvement in methods of producing a variable head in a stream of paper-making stock in response to changes in the consistency of said stock, comprising the steps of creating a flowing stream of said stock, confining a portion of the stream so produced, and creating a high degree of internal friction in said stream substantially throughout the cross-sectional area of a portion of the length of the confined portion of the stream and thereby causing the rate of flow of the stock through said area to vary inversely with said changes in consistency of the stock.

Papermaking Machine

Patent No. 2,402,063. Bernard A. Malkin, Lachine, Quebec, Canada, assignor to Dominion Engineering Works Limited, Lachine, Quebec, Canada. Application May 4, 1942, Serial No. 441,737. In Canada January 30, 1942. 11 Claims. (Cl. 92—43.)

1. A cylinder paper machine comprising a vat, an inner vat-circle wall of generally cylindrical curvature in cross section extending between the end walls of the vat in spaced relation to the bottom and side walls of the vat, a cylinder mold journalled in said vat in spaced opposing relation to the inner vat-circle wall to form therewith an inner vat-circle space affording an inner flow passage connecting the ends of an outer flow passage afforded by the space between the inner vat-circle wall and the opposing bottom and side walls of the vat, the outer defining wall of said outer flow passage being provided with a stock inlet located intermediate the ends of said passage and with two stock inlets located at opposite sides of the inlet and between the latter and the ends of said passage, and a separate flow-directing valve controlling each outlet and movable across the outer flow passage from a position covering said outlet to a position blocking the portion of the outer flow passage located between said outlet and said inlet.

Doctor Blade

Patent No. 2,404,689. Viggo Carlsen, Norwich, and Alwin Heinrich, Taftville, Conn., assignors to The Aspinook Corporation, Jewett City, Conn., a corporation of Delaware. Application January 16, 1945, Serial No. 572,998. 1 Claim. (Cl. 101—153.)

A doctor blade comprising a steel backing beveled down to a razor sharp edge and a plating of chromium on the unbeveled underside extending to the edge, the plated side of said edge being adapted and arranged to bear on a printing roller of a textile printing machine.

Paper Products and Method of Making Same

Patent No. 2,399,982. Kenneth W. Britt, Norwood, Pa., assignor to Scott Paper Company, Chester, Pa., a corporation of Pennsylvania. No Drawing. Application August 13, 1941, Serial No. 406,728. 11 Claims. (Cl. 92—40.)

7. The method of increasing the wet strength of paper while preserving the dry tear resistance thereof, which comprises impregnating paper with a solution of sodium silicate in an amount sufficient to furnish to the paper between 0.1% and about 2.5% sodium silicate, figured as SiO_2, by weight based on the dry weight of the paper at a point in the production of said paper after the formation of the interfelted web and prior to the completion of the drying thereof, and heating said paper above 212° F. to deposit sodium silicate reducing the tendency of the paper fibers to swell upon the application of water, within and upon the surface of the fibres throughout the interfelted structure of the paper.

Method and Machine for Burnishing the Surface of Paper

Patent No. 2,404,606. Arthur Ronald Trist, London W. 1, England. Application December 30, 1942, Serial No. 470,705. In Great Britain February 21, 1942. 8 Claims. (Cl. 92—68.)

1. In a method of burnishing the surface of paper, the steps of supporting a paper web to be burnished on a resilient bed and pressing a comparatively rigid blade having at its edge a thickness of more than 10 thousandths and less than 60 thousandths of an inch against said web at an oblique angle relative to the surface of the bed of sufficient magnitude to ensure contact between the web and the blade edge over the entire thickness of the latter and with sufficient force to depress a zone of said web corresponding substantially to the blade edge into said resilient bed while heating said blade and causing a relative movement of between about 700 and 1000 feet per minute between the surface of said resilient bed and web on the one hand and said blade on the other hand at substantially right angles to the edge of said blade and in such a way that the body of the blade overhangs the part of the web that is about to pass under the blade edge thereby forming directly adjacent said blade edge in said resilient bed a wave of resilient material, which presses a zone of said web adjacent said depressed zone of said bed into frictional contact with a surface of said heated blade.

Papermaking Machine and Method

Patent No 2,396,696. Earl E. Berry, deceased, late of Beloit, Wis., by Wilma E. Berry, executrix, Beloit, Wis., assignor to Beloit Iron Works, Beloit, Wis., a corporation of Wisconsin. Original application May 31, 1941. Serial No. 396,066. Divided and this application February 25, 1944. Serial No. 523,806. 12 Claims. (Cl. 92—43).

4. In a cylinder type paper making machine including a pair of spaced opposed cylinder molds and means defining formation zones at nonadjacent sides of said cylinder molds, the improvements which comprise partition walls separating said formation zones into superimposed compartments, means for flowing stock in opposite directions through the top and bottom compartments along the lengths of the cylinder molds, and means for flowing stock through the intermediate compartments radially onto said cylinder molds.

◆

Paper Machine Maintenance

(Continued from page 128)

oil so it will lubricate and protect the bearing against corrosion, it is necessary that the oiling system be of the type which will insure adeqaute removal of any water picked up during the time the oil circulates through the bearing. The oil should be filtered 100 per cent each time it goes to the bearing with a type of filter which will not permit any dirt or sludge to go to the bearing. This can be accomplished by means of a gravity bag filter if the unit is properly installed. Periodic use of a centrifuge to clean up the bottom of the oil tanks will assist in maintaining the oil in the best of condition.

If the best oil and equipment are not used, the bearings will corrode and become full of sludge, carbonized oil and water, resulting in failure. It is a very expensive procedure in both cost of bearings and lost production time to replace a major portion of the anti-friction bearings on a large dryer section. Where the best of equipment and best grade of oil have been used, satisfactory operation has been obtained over a number of years without excessive bearing failure.

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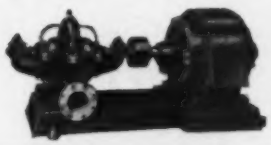

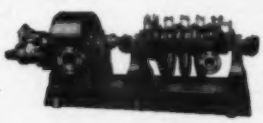

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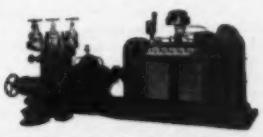

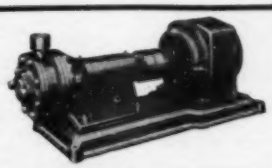

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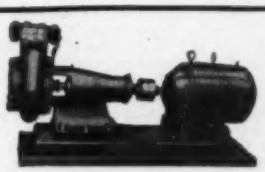

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Factories: 301 W. Ave. 26, Los Angeles, Calif.; Quincy, Ill.; Canton 6, Ohio

New Catalogues and Publications

American Air Filter Company, Inc., 1st and Central Ave., Louisville 8, Ky. — Various types of industrial dust problems and typical applications of air filters to such problems are discussed in a 23-page illustrated booklet compiled by this company. The booklet includes a chart of size and characteristics of air-borne solids; also sections dealing with atmospheric dust, and filtered air for: industrial air conditioning, industrial ventilation, drying operations, product finishing, control of bacteria and mold spores, cooling electric equipment, engines and compressors, as well as miscellaneous industrial applications. Of particular interest to the paper manufacturer is a section on filtered air for drying operations. Address inquiries to American Air Filter Company, 215 Central Ave., Louisville 8, Ky.

Chain Belt Company, 1600 W. Bruce St. Milwaukee 4, Wis.—Now being distributed by this company is Bulletin No. 46-10, containing illustrations and brief descriptions of Rex steel fabricated and cast chains. Standard attachments are also illustrated, and information is given on cast and cut tooth sprockets. Among the installations shown are a log haul and refuse conveyor chain with scraper attachments for moving wood to the chippers in a pulp mill, and refuse conveyor chains for moving hog fuel from dump to boiler house. Copies of this bulletin may be obtained by writing direct to the company.

Clark Tructractor Division, Clark Equipment Company, Battle Creek, Mich.—A new 36-page catalogue covering the complete line of materials handling machines, both gas and battery powered, made by this company, may be had by writing to the above address. In addition to specifications of the regular models of fork lift trucks and towing tractors, the catalogue shows the new "Yardlift" series of pneumatic tired fork trucks. Also illustrated are handling attachments for fork trucks, and a newly developed "Paul-Pac" for unit loads without pallets. Also included is a seven-page series of action pictures, which include paper handling.

Harris-Seybold Company, 4510 E. 71st St., Cleveland 5, Ohio — A new handbook, "Friendly Tips" is now being distributed to the personnel of this company. In its 40 pages are covered all phases of the Harris-Seybold activities. The historical background of the orgnization, covering more than a half century, is presented in an interesting manner. Photographs, pictographs and drawing are used to tell the story of company policies.

Honan-Crane Corporation, 803 Indianapolis Ave., Lebanon, Ind.—In Volume 3, No. 1, of "Clean Oil," a quarterly published by the above company, are illustrated and described seven types of purifiers, clarifiers and sump cleaners. Their common applications are explained. The eight-page booklet, printed in two colors, is profusely illustrated. Also included are case histories showing the values of oil purification equipment. Write for copy on company letterhead.

Lawrence Machine and Pump Corporation, 371 Market Street, Lawrence, Mass.—A new four-page bulletin, No. 205-2, has been issued by this company, showing its high-density paper stock pumps. It is profusely illustrated.

Liquid Conditioning Corporation, 114 East Price St., Linden, N. J.—A recently completed condensed catalogue is now available from this company. It gives concise information on the most modern methods and equipment for treatment of water, purification of process liquids, and recovery of valuable substances from waste liquids. Also described are various types of Liquon equipment for paper mills and for cooling-water treatment, treatment of industrial liquids and continuous boiler blow-off. The catalogue is illustrated with diagrams. Tabulations of the various impurities found in water, their effects, limits of tolerance in different applications and methods or removal, are included, as well as a chart showing the results of treating a given water by six methods.

The Norton Co., Worcester 6, Mass.—An attractive, well-illustrated booklet of 21 pages descriptive of the heavy duty refractories made by this company is now available. In addition to the tables of properties of refractories, there are charts of thermal expansion, thermal conductivity, and temperature conversion, as well as lists of atomic weights and the melting points of metallic elements. Ask for Catalogue R-1-Q. A four-page leaflet on Norbide Abrasive may also be had on request.

Pittsburgh Plate Glass Co., Columbia Chemical Division, Fifth Avenue at Bellefield, Pittsburgh 13, Pa.—Attractive folders have been published by this company on the following subjects: Caustic Soda, Form A-102; Soda Ash, Form A-202; Caustic Ash, Form A-302; Modified Sodas, Form A-322; Cleaner & Cleanser, Form A-332; Liquid Chlorine, Form A-502; Sodium Bicarbonate, Form A-602. The bulletin on Columbia Soda Ash, Form A-202 will be of special interest to the paper industry. Write to address above.

The Reliance Electric & Engineering Company, 1076 Ivanhoe Road, Cleveland 10, Ohio.—Just published by this company are two bulletins on its "Series C" induction motors. Bulletin C-118 covers protected (open type) frame sizes 203 to 326, with horsepower ratings from 1/2 to 20 hp.. 600 to 3600 rpm. Considerable space is given to construction details, and to a description of the thirteen step insulation for Class A and Class B Motors. Bulletin C-125 is descriptive of the totally-enclosed, fan-cooled "Series C" squirrel-cage frame sizes 224 to 326, for two-and three-phase a-c circuits.

Taber Instrument Corp., North Tonawanda, N. Y.—A factual, handy bulletin has been issued by this company, containing a complete summation of stiffness-testing technique in present-day practice among industrial plants, research laboratories, testing departments and bureaus. The Taber V-5 Stiffness Gauge is described and illustrated. Brief descriptions are given of two accessories: one for uniform blacking out of specimens to eliminate possible variation in test data that may be attributed to off-size specimens cut with single shear; the other to step-up the instrument's applicability from 5,000 to 10,000 Stiffness Units. Laboratory research and materials testing executives may secure this bulletin by writing to Taber Instrument Corp., 111-PI Goundry St., North Tonawanda, N. Y.

C. H. Wheeler Manufacturing Co. Lehigh and Sedgley Aves., Philadelphia 32, Pa.—A compact catalogue on its steam condensers has been distributed by this company. Illustrations bring out the special design features of the various types of condensers, and cross-section photos show views of the different types of tubes and tube plates. One section of the catalogue is devoted to graphs, and tables. Two tables, one a "Pressure-Temperature Conversion Table" and another, "Logarithms to the Base," are displayed across two pages. The catalogue is attractively printed in color. Ask for No. 1461.

BOOKS

New Book From Private Press of Dard Hunter—The seventh volume on the subject of papermaking to come from the Mountain House Press, Chillicothe, Ohio, private press of Dard Hunter, is Papermaking in Indo-China. Authored by Dr. Hunter, the text of the book was written in 1935 after his sojourn in the ancient villages of Yen-Thai and Lang-Buoi, Tonkin, Indo-China, where the craft of papermaking has been practiced for many years as an essential industry. Circumstances, however, delayed printing of the volume until now.

The book, published in a limited edition of 155 copies, describes in detail the making of paper as the craft was practiced previous to the Asiatic conflict, and it gives an account of Daphne bark, the superior material used in Indo-China, Nepal, and Tibet as a strong and durable fiber for making paper. The text is illustrated with fifteen photographic reproductions of the various processes used by the papermakers in Tonkin. There are also pictures of three Daphne papermaking plants reproduced from the treatise by Dr. N. Wallich in Asiatic Researches, published in Calcutta, 1820. Of the original specimens of paper in each volume, one specimen was made especially for the book by an old woman papermaker in the village of Yen-Thai.

The paper employed in printing Paper Making In Indo-China was made by hand in the mill at Lime Rock, Connecticut in 1932. The mill ceased operation a year or two later; the equipment brought from England, however, remains intact.

The book is bound permanently in boards with leather back, gold lettered. The sides are covered with black handmade paper printed in two colors from a seventeenth century woodblock produced in North China. The binding has been executed by Peter Franck of Sherman, Connecticut.

The price of the book is $38.50 a copy. Correspondence in reference to it should be addressed: Dard Hunter, Mountain House Press, Chillicothe, Ohio.

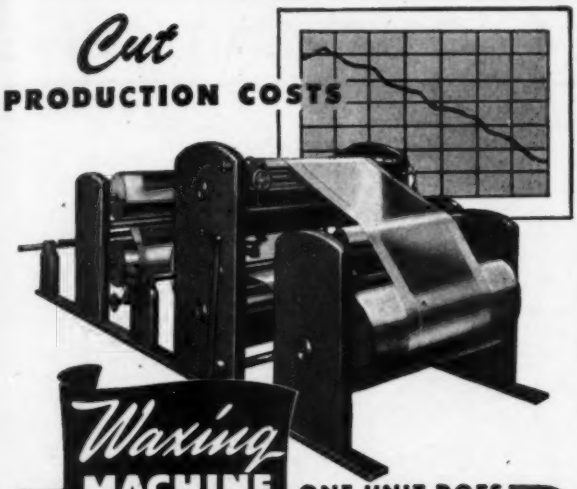
The Federal Labor Laws (A Manual for Supervisors)—This book, as stated in its foreword, presents information about Federal labor laws which every foreman should know. It is a loose-leaf book of 72 pages, 6½x9½ inches, in fabrikoid cover. The contents cover: The National Labor Relations Act, the Fair Labor Standards Act (Wage and Hour Law), The Walsh-Healey Public Contracts Act, Wage Stabilization, The Social Security Act. (Old Age and Survivor's Insurance and Unemployment Compensation), The United States Employment Service, The Fair Employment Practices Committee, and Veterans' Rights. Prepared by the Staff of the National Foremen's Institute, the book is priced at $2.50 a copy. The publisher is the National Foremen's Institute, Inc., Deep River, Conn.

Getting the Right Start in Direct Advertising—Written expressly for beginners, this book, authored by Harrie A. Bell, has been published by Graphic Books, Inc., 17 East 42nd Street, New York 17, N. Y. Among the chapter headings are: The Basic Idea, Suggestions on Writing Copy, Suggestions on Making the Layout, Where Are the People We Want to Reach?, Care in the Mailing Process, The Tie-Up with Other Advertising, How About Illustrations?, What Does Color Do?, and When to Use Direct Advertising.

In addition to other chapters, there is a 30-page appendix on an Introduction to House Organs.

The book is priced at $4 a copy.

Cut
PRODUCTION COSTS



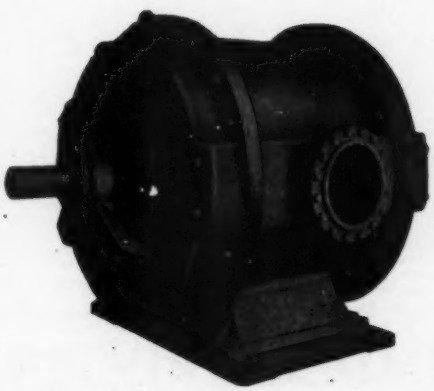
Waxing **MACHINE**

ONE UNIT DOES MULTIPLE JOBS

The demand for waxed papers is greater than ever before — despite raw paper shortages. There is a Hudson-Sharp waxer designed for any one of the many wax processes. No. AW-3, illustrated, is our wax coater — for single or double facing.

HUDSON-SHARP
MACHINE CO • GREEN BAY • WIS

ONLY NASH VACUUM PUMPS HAVE ALL THESE FEATURES



One Moving Element. Non-pulsating Vacuum. No Internal Wearing Parts. No Internal Lubrication. Handles Liquid With Air. No Expert Attendance. Constant Efficiency. Low Maintenance Cost.

NASH ENGINEERING COMPANY
SOUTH NORWALK, CONNECTICUT, U. S. A.

BOWSER
ESTABLISHED 1885

LUBRICATING SYSTEMS
have a lot to do with
PAPERMAKING PROFITS

Bowser lubricating systems help dryers, calender stacks, Jordans, hydrafiners, compressors and other paper mill machines to operate efficiently . . . to stay on the job.

For more than fifty years Bowser lubricating systems have smoothed the way for profitable production in paper mills by reducing wear, downtime and maintenance costs.

You are invited to discuss the lubricating requirements of your mill with a Bowser engineer. No obligation—no cost. Just write.

BOWSER, INC.
1315 Creighton Avenue, Fort Wayne 2, Indiana

LIQUID CONTROL
SPECIALISTS
SINCE 1885

CURRENT MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

Quotations to consuming mills, cents per pound or dollars per hundred pounds, f.o.b. New York, follow:

(All Prices Are Nominal)

	per cwt.
Blue Overalls	8.50 to 9.00
Corduroy, Men's	5.50 to 6.00
Corduroy, Ladies'	5.25 to 5.75
Washables, No. 1	5.75 to 6.00
Percales	7.00 to 7.50
Light Prints, No. 1	6.50 to 7.00
Khaki Cuttings—	
Bleachable	7.50 to 8.00
Unbleachable	6.50 to 7.00
New White Canvas	10.00 to 10.50
New Mixed Blacks	4.50 to 5.00
Canton Flannels, Bleached	10.50 to 11.00
Shirt Cuttings—	
New White No. 1	11.00 to 12.00
White Shrunk	9.50 to 10.50
Silesias No. 1	8.50 to 9.00
New Unbleached	11.50 to 12.50
Fancy	6.50 to 7.00
Linen Cuttings—	
American	9.00 to 10.00
White	15.00 to 16.00
Grey	14.00 to 15.00

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

(All Prices Are Nominal)

	per cwt.
Roofing—	
No. 1	2.10 to 2.20
No. 2	2.00 to 2.10
No. 3 and No. 4	1.90 to 2.00
Twos and Blues—	
Repacked	3.75 to 4.25
Thirds and Blues—	
Repacked	3.50 to 4.00
Miscellaneous	2.75 to 3.00
Whites, No. 1—	
Repacked	4.75 to 5.25
Miscellaneous	4.00 to 4.50
White, No. 2—	
Repacked	3.75 to 4.25
Miscellaneous	3.25 to 3.50

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shapperies	

ROPE and BAGGING

f.o.b. and ex dock New York City

(All Prices Are Nominal)

	per cwt.
Gunny No. 1—	
Foreign	Nominal
Domestic	4.75 to 5.00
Wool Tares—	
Light	5.00 to 5.25
Heavy	5.25 to 5.50
No. 1 Scrap Bagging	4.00 to 4.50
Manila Rope—	
No. 1 large	6.50 to 6.75
No. 1 small	5.50 to 5.75
Sisal Rope—	
No. 1 large	6.00 to 6.50
No. 1 small	5.50 to 6.00
New Burlap Cuttings	5.50 to 6.00
Jute Threads—	
Foreign (Nom.)	6.50 to 7.00
Domestic	6.00 to 6.50
Strings—	
No. 1 sisal	6.00 to 6.50
No. 2 sisal	5.50 to 6.00
Soft jute	6.00 to 6.50
Mixed	2.50 to 3.00

WASTE PAPER

The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:

(All Prices Are Nominal)

	per ton
Shavings—	
Hard White Env. Cuts	165.00—
Hard White, No. 1	140.00—
Soft White, No. 1	120.00—
Soft White, One-cut	140.00—
Soft White, Misc.	110.00—
Fly Leaf, No. 1	65.00—
Fly Leaf, Woody, No. 1	55.00—
No. 2 Mixed Col. Woody	45.00—
Flat Stock—	
No. 1 Heavy Books and Magazines	50.00—
Mixed Books	40.00—
Ledger Stock—	
No. 1 White	85.00 to 90.00
No. 1 Mixed (Colored)	75.00 to 80.00
Manilas—	
New Env. Cuttings	130.00 to 140.00
New Env. Cuts, One-Cut	—
Extra Manilas	—
Manilla Tab Cards, Free of Ground Wood	80.00 to 85.00
Colored Manila Tab Cards	65.00 to 70.00
Kraft—	
New Envelope Cuttings	120.00 to 125.00
Tripled Sorted No. 1 100%	70.00 to 75.00
New 100% Cor. Cuts	65.00 to 70.00
No. 1 Old Assorted	55.00 to 60.00
News—	
White Blank	68.00 to 70.00
Overissue	45.00 to 47.00
No. 1 Baled	33.00 to 35.00
Old Corrugated Containers	34.00 to 36.00
New Corrugated Cuts	42.00 to 44.00
Mill Wrappers	30.00 to 32.00
Box Board Chips	18.00 to 20.00
No. 1 Mixed Paper	23.00 to 25.00

CHEMICALS

f.o.b. shipping point

(All Prices Are Nominal)

Alum (Papermakers)—	
Lump, cwt.	4.25—
Ground, cwt.	4.00—
Powdered, cwt.	4.40—
Blanc Fixe—	
Pulp, bulk, ton	$55.00—
Dry, barrels, pound	07.50—
Bleaching Powder—	
Drums, cwt.	2.75 to 3.25
Casein (Domestic Standard)	
20-30 mesh (bags), lb.	
80-100 mesh (bags), lb.	39.00 to 40.00
Argentine, lb.	42.00 to 43.00
China Clay—	
Domestic Filler Bulk (mine) ton	8.50 to 15.00
Domestic Coating Bulk (mine) ton	12.00 to 22.00
Imported (ship side) Bulk (lump) ton	22.00 to 25.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silicin), lb.	1.60 to 1.85
Glyc. (C.P.) drums, lb.	55¼ to 55⅝
Litharge, powd., bbl., lb.	16 to 16½
Rosin (Gum)—	
New York, per 100 lbs.	
E	10.50—
F	11.50—
G	11.50—
WW	11.50—
Rosin (Wood), carlots	7.50—
Salt Cake—	
Dom. bulk (wks) ton	22.00 to 24.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	25.00 to ——
Soda Ash—	
Bulk (works), cwt.	1.90 to ——
Paper Bags, cwt.	1.20 to 1.35
Barrels, cwt.	1.35 to 1.60
Soda (Caustic)—	
Solid, drums, cwt.	2.50—
Ground and flake, drums, cwt.	2.90 to 3.00
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg., 35 gal. drums, (works), cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	4.02—
Pearl, barrels, cwt.	4.13—
Paper (Sp.) bags, cwt.	4.13—
Powdered, barrels, cwt.	4.13—
Sulphur (Crude) (Mine) bulk, long ton	16.00 to —
Talc—	
Dom. 100 lb. bags (mine) ton	16.00 to 28.00
Canadian	35.00 to 45.00
Titanium Dioxide—	
Barium Pig., bbls., lb.	.06¼ to .06¾
Calcium Pig., bbls., lb.	.06 to .06½
Zinc Sulphide, bbls., lb.	10.00 to 10.25

WOOD PULP

Prices, dollars per short, air dry, tan, on dock American ports and f.o.b. shipping points with former OPA freight allowances, are:

(All Prices Are Nominal)

Bleached sulphite, Swedish	120.00—
Bleached sulphite, Finnish	165.00—
Bleached sulphite, dom.	120.00 to 125.00
Easy bleaching sulphite	—
Unbleached sulphite, Swed.	94.50—
Unbleached sulphite, Fin.	132.50—
Unbleached sulphite, dom.	115.00—
Unbleached kraft, Swedish	89.00—
Unbleached kraft, Finnish	132.50—
Unbleached kraft, northern	105.00 to 112.50
Unbleached kraft, southern	90.00—
Bleached sulphate, Swedish	124.50—
Bleached soda, domestic	120.00 to 125.00
Sulphite screenings, dom.	—
Sulphate screenings, dom.	—
Groundwood, domestic and Canadian	80.00 to 85.00

PAPER

f.o.b. New York City

(All Prices Are Nominal)

Boards—	
Binders	94.00—
Chip	70.00—
Chip, tube and can	72.50—
Chip, full blending	75.00—
Chip, sgl. mla. lined	85.00—
Coated, white patent .018	101.50—
.020 and heavier	90.00—
Kraft liner	84.00—
Filled News	72.50—
Container	90.00—

Book Papers—f.o.b. mill with quantity, weight, manufacturing and other differentials allowed:

Uncoated (Untrimmed)

Book, White (M. F.)—	
A Grade E. F.	—
B Grade E. F.	—
C Grade E. F.	—
D Grade E. F.	—
No. 2 Uncoated Offset 4 sides, White	—

Coated White (Trimmed 4 sides)

No. 1 Glossy	—
No. 2 Glossy	—
No. 3 Glossy	—
No. 4 Glossy	—
C2S Offset	—
C1S Litho (Varnish)	—
C1S Litho (Non-Varnish)	—

Writing Papers—f.o.b. mill with zone, quantity, packing and other differentials allowed:

Rag Content Bond—	per cwt. 20 lb.	16 lb.
Extra 100% Rag	—	
100% Rag	—	
75% Rag	—	
50% Rag	—	
25% Rag	—	

Rag Content Ledger—	per cwt. Zone 1
Extra 100% Rag	—
100% Rag	—
85% Rag	—
75% Rag	—
50% Rag	—
25% Rag	—

Sulphite Bond—	per cwt. 20 lb.	16 lb.
Air dry, watermarked	—	
No. 1 (M.F.) watermarked	—	
No. 2 (M.F.) watermarked	—	
Plain (M.F.) unwatermarked	—	

Sulphite Ledger—	per cwt. Zone 1
No. 1 (M.F.) watermarked	—
No. 2 (M.F.) watermarked	—
Plain (M.F.) unwatermarked	—

Glassine (f.o.b. mill)—	per cwt.
Embossed (25 lbs. up)	—
Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—
Greaseproof—	
Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—

News—	per ton
Rolls, Standard (Contract)	90.00—
Rolls (Spot)	(Nominal)
Sheets	109.00—

Tissues (Carlots)—	per ream
White No. 1	1.65—
White No. 2	1.55—
Bleached Anti-Tarnish	—
Colored	—
Anti-Tarnish Kraft	1.25—
Manila	1.00—
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.80—
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs.	.80—
Toilet, Bleached (M shts.) per cs.	7.50—
Toilet, Unbleached (M. shts.) per cs.	6.00—

Towels—	per case
Bleached	4.50—
Unbleached	4.00—

Wrappings (Kraft)—	per cwt.
Super-Standard	7.00 to 7.50
No. 1 Wrapping	6.50 to 7.00
Standard Wrapping	6.25 to 6.75
Standard Bag	6.25 to 6.75
Variety Bag	—

Wrappings (Sulphite and Bleached Kraft)—(Rolls, f.o.b. mill)

Bleached Papers—	per cwt.
M.F. & M.G. Waxing, 20 lb. (Carloads only (10,000 lbs.)	—
Drug wrapp., 35 lb.	—
Unbleached Papers—	
Com. Gr'd Butch. 40 lb.	—
No. 1 Butchers	—
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite, 30 lb.	—
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite, 30 lb.	—
Steam Finish, 50 lb.	—
Water Finish, 50 lb.	—

Manilas—	per cwt.
Envp. Mla., Sub. 16-40 (No. 1)	—
Envy. Mla., Sub. 16-28 (No. 2)	—
Envy. Mla. (Prices based on large sheets untrim'd ream-marked, in bdls.)	
Wrapp. Mla. 25 lb. up—	
No. 1	—
No. 2	—
M.G. Sulphite and Kraft (other than Waxing)	
Grade B30 lb.	—
Grade A-22 lb.	—

CUTS COSTS IN ANY PAPER MILL

Does it make sense to permit high-priced machinists and maintenance mechanics to cut off piping, angle iron or rods by hand, when MOST OF THOSE SAME JOBS can be cut more conveniently and economically on this portable, low cost machine?

Pays for itself in labor saving and speeds repairs and maintenance jobs. A machine that is FAST BECOMING standard in modern paper mills.

Kalamazoo METAL CUTTING BAND SAW

A VALUABLE TOOL FOR MAINTENANCE

WRITE FOR BULLETIN

Kalamazoo TANK & SILO CO
KALAMAZOO - MICHIGAN

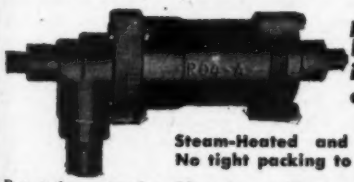
COLORS . . .
for Board and Paper

Green Chromium Oxides
Black, Brown, Red, Yellow Iron Oxides
Lamp Black—Umbers—Venetian Reds—Yellow Ochres

C. K. WILLIAMS & CO.
Easton, Pennsylvania

GUARANTEED LEAK-PROOF "DIAMOND"

REVOLVING JOINTS

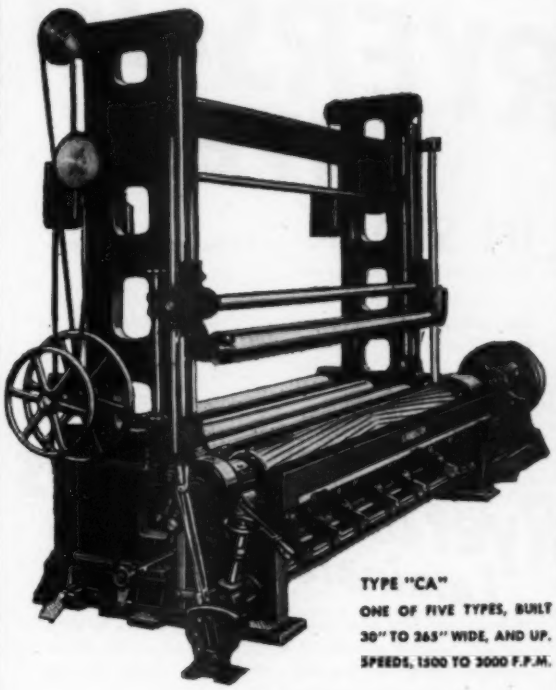


permanently end leaking and stuffing box trouble on all kinds of

Steam-Heated and Water-Cooled Rolls
No tight packing to act as brake on roll.

Patented construction. Many in use 10 years or more. Specially compounded molded gasket lasts up to 15 months in severest service—easy, quick and inexpensive to replace. We also manufacture leak-proof SWING JOINTS and BALL JOINTS. Bulletin and price list upon request.

406 Market St. • DIAMOND METAL PRODUCTS CO. • St. Louis 2, Mo.



TYPE "CA"
ONE OF FIVE TYPES, BUILT 30" TO 265" WIDE, AND UP. SPEEDS, 1500 TO 3000 F.P.M.

LANGSTON
Slitters & Roll Winders

LANGSTON HAS NEVER COMPROMISED ON DESIGN TO DECREASE COST, WHERE ANY WORTHWHILE FEATURE OR IMPROVEMENT WAS INVOLVED THAT WOULD ADD TO THE EFFICIENCY OR DEPENDABILITY OF OUR MACHINES.

AMONG OTHER IMPROVEMENTS TO BE FOUND IN LANGSTON SLITTERS AND ROLL WINDERS ARE THE BOX SECTION SIDE FRAMES, WHICH INCREASE RIGIDITY AND IMPROVE APPEARANCE.

ASK FOR THE LATEST DETAILS ON LANGSTON SLITTERS—UNBEATABLE FOR HIGH SPEED OPERATION AND LOW MAINTENANCE.

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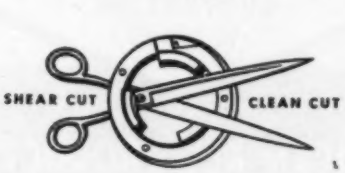

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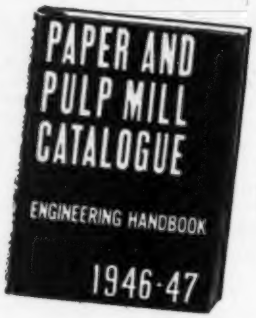

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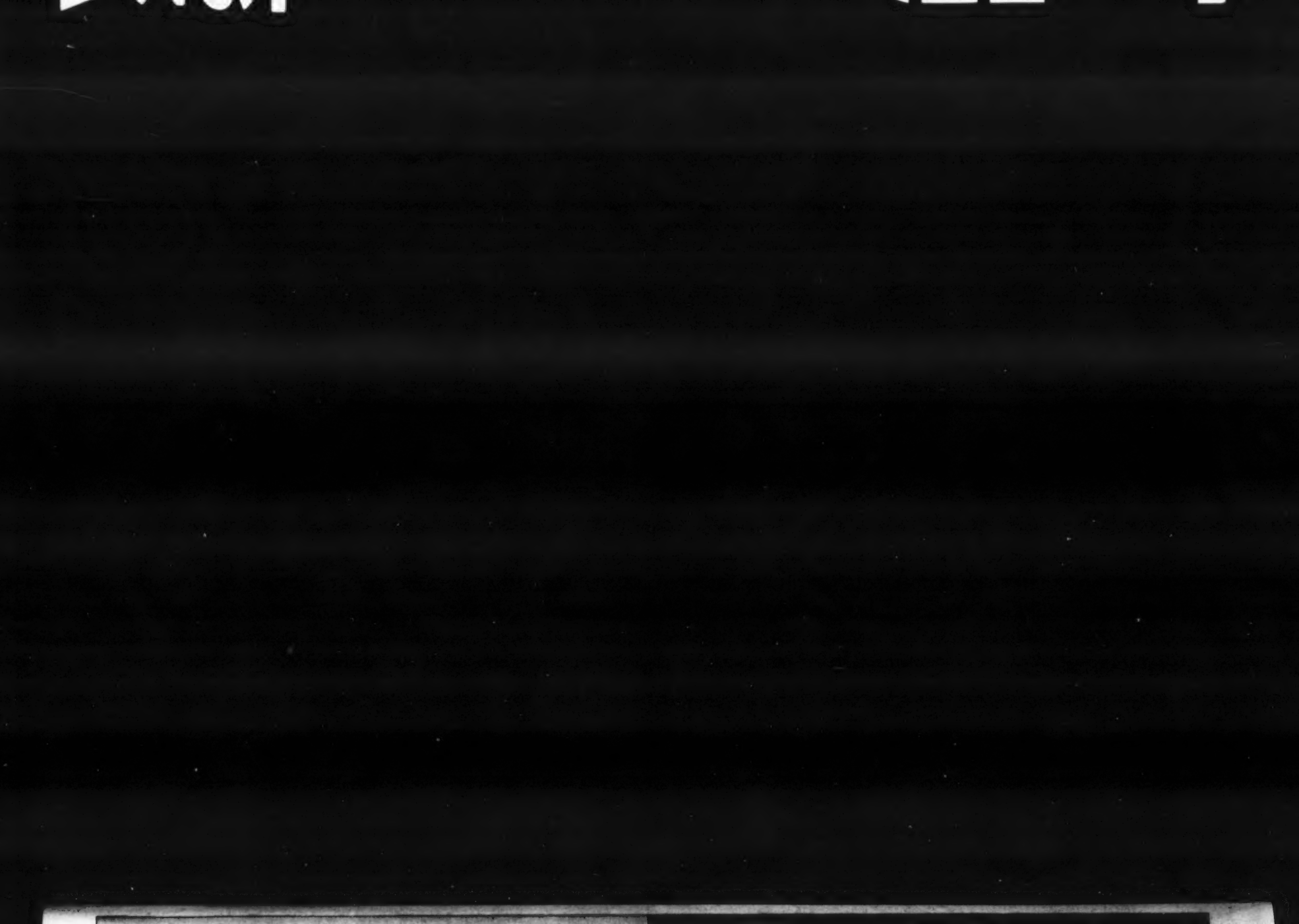
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